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THE LINNEAN SOCIETY.

I. *On* Napoleona, Omphalocarpum, *and* Asteranthos. *By* John Miers, *F.R.S., V.P.L.S., Dignit. et Commend. Ord. Imp. Bras. Rosæ, &c.*

(Plates I.–IV.)

Read June 4th, 1874.

THE plants arranged in the small group of the *Napoleoneæ* consist of two heterogeneous genera, the position of which in the system has long been a puzzle to botanists. One of them is of African, the other of Brazilian origin. The former, *Napoleona*, was established by Palisot de Beauvais for a beautiful species discovered by him in 1787, at which time his drawing and description were made, though not published till 1804[1]. *Asteranthos*, at first thought to have been brought from Africa, was afterwards found to be of South-American growth. Desfontaines, who first described and figured the latter in 1820[2], considered that the two genera should constitute a group belonging to *Symplocineæ*. Desvaux changed the name *Napoleona* into *Belvisia*, in honour of Palisot de Beauvais[3]. Desfontaines subsequently, as well as Brongniart, placed this group between *Memecylaceæ* and *Rhizophoraceæ*. Brown, in 1822[4], proposed it as a distinct family (*Belvisieæ*), to stand near *Symplocaceæ*, with a tendency towards *Rafflesiaceæ*. Lindley in 1833[5], and again in 1836[6], placed *Belvisiaceæ* after *Campanulaceæ* and *Sphenocleniaceæ*, and before *Columelliaceæ*; but in 1845[7] he changed this view, arranging it between *Rhizophoraceæ* and *Melastomaceæ*. De Candolle, in 1839[8], located the *Napoleoneæ* after *Sphenocleneæ* and *Columelliaceæ*, and before *Vaccinieæ*. Endlicher, in 1839[9], regarded the *Napoleoneæ* as doubtful genera of the *Ebenaceæ*; he arranged them provisionally between *Symploceæ* and *Columelliaceæ*. Meissner, in 1843[10], placed the *Belvisieæ* between *Passifloreæ* and *Loasaceæ*. Jussieu, in 1844[11], in describing a second species of *Napoleona*, placed this

[1] Fl. Owar. ii. 32, tab. 68. [2] Mém. Mus. vi. 9, tab. 3. [3] Journ. de Bot. appl. iv. 130.
[4] Linn. Trans. xiii. 222. [5] Nixus and Introd. Bot. p. 230. [6] Nat. Syst. p. 239.
[7] Veg. King. p. 728. [8] Prodr. vii. 550. [9] Gen. Pl. p. 745. [10] Gen. Pl.
[11] Ann. Sc. Nat. 3me sér. ii. 227, tab. 4.

group between *Cucurbitaceæ* and *Passifloreæ*. Lindley, in 1845, described and figured a third species of *Napoleona*, collected by Whitfield in Sierra Leone[1]. Sir Wm. Hooker and Dr. Planchon, in 1848[2], first suggested that the *Napoleoneæ* approached nearer to *Myrtaceæ*, as shown by the relation of *Napoleona* to *Gustavia* in *Lecythidaceæ*, and to *Luffa* in *Cucurbitaceæ*; but they offered no evidence in support of so novel a view. Mr. Bentham[3], in 1849, adopted the same opinion, making the *Napoleoneæ* a suborder of *Myrtaceæ*, allied to *Barringtonieæ*, on account of its numerous stamens seated upon a disk over an inferior ovary. Agardh, in 1859[4], attempted to show that the *Napoleoneæ* are allied to *Ternstrœmiaceæ*. Messrs. Hooker and Bentham in 1867[5], maintaining their former views, arranged the *Napoleoneæ* as a third subtribe of their *Lecythideæ*, which is their fourth tribe of their *Myrtaceæ*, thus associating it intimately with *Barringtonieæ* and *Lecythideæ* proper. Finally, Dr. Masters, in 1868[6], contributed a valuable memoir on *Napoleona*, drawn up from his examination of a flowering species growing at Kew. Its structure is there minutely described; but he offered no opinion of the true affinity of the group, except in accepting the view of Bentham and Hooker, and in concluding that the *Myrtaceæ* is its more fitting resting-place.

We may attribute this extraordinary divergence in the opinions of botanists entirely to the confused notions entertained about the several floral parts, which had been regarded as modified petals by some, as a kind of compound paracorolla by many, while others have considered these parts transformed stamens, or nectariferous emanations from a disk, or coronal appendages analogous to those of *Passiflora*. A very careful examination of these two genera has convinced me that all have been wide of the mark in regard to their true affinity. In order, therefore, to arrive at a proper conclusion, it is desirable to scrutinize the floral and carpological structure with greater circumspection than has hitherto been employed.

1. Napoleona.

In conducting this analysis, it appeared to me that the first essential condition was to separate the different parts from one another. With this view, after moistening a dried flower, a knife was carefully introduced beneath the corolla, so as to cut off its connexion with the disk, which supports all the floral parts; the sepals and ovary were thus set free. The corolla was then carefully detached from the corona in the same manner. This, in the bud state, is plicated and incurved, so as to form a depressed globe; but when fully developed, and thus separated, it is seen to be gamopetalous, petaloid, orbicular, quite rotate, marked beneath by several subulate flat subprominent radiating nerves, connivent at the base, varying in the several species from 30 to 40 (the intermediate spaces being membranaceous); and they terminate in as many short obtuse peripherial segments of the border.

The corona, now isolated, is seen to consist of three distinct whorls, all affixed, like the corolla, upon the outer surface of the disk. The outer whorl, now fully exposed to view, as seen from below, consists of 60 to 70 distinct, narrow, pointed segments, free to the

[1] Bot. Reg. (1844) p. 780; Gard. Chron. 1844, p. 480; Veg. Kingd. (cum icone) p. 728.
[2] Hook. Icon. vii. tab. 799.
[3] Niger Flora, p. 361, tab. 49.
[4] Theor. p. 132.
[5] Gen. Plant. i. 696.
[6] Journ. Linn. Soc. x. 492.

base, somewhat shorter than the corolla, all radiating outwards, each with a fine median nerve. In a circle, about $\frac{1}{4}$ of an inch beyond the points of their attachment, we now observe a very distinct moniliform ring of prominent vesicles, one upon each segment, bearing the appearance of as many sterile anther-cells. This important feature appears to me to afford a key to the nature of the whole structure, and seems to have been overlooked by all botanists, except perhaps by Dr. Masters[1].

The second whorl of the corona is also petaloid, formed of 40 to 60 similar but broader segments, sometimes as long as, often shorter than the corolla. These are confluent along their margins towards the base for $\frac{1}{2}$ or $\frac{3}{4}$ of their length, thus forming a cup; but the external portions are quite free, erect, or curving inwards. Looking at this cup from below, we see a similar ring of prominences as in the former case, and at the same distance from the base, all forming as many distinct hollow patches, like corrugated vesicles.

The third or internal whorl consists of a series of linear segments like the preceding, and, I believe, constantly 20 in number. They are attached to the disk in a similar manner, are quite free to their base, their margins touching or overlapping each other; they have a fine nerve along their centre up to a short distance below the apex, there terminating in a prominent point, where the anther is attached; these have been considered true filaments by all botanists. The anther is oblong, a little curved, appearing 2-lobed, owing to a deep furrow down their middle; it opens bivalvately at the bottom of the furrow, its margins becoming detached from a prominent line upon the connective; before dehiscence, they are consequently 2-locellate; after bursting they appear 1-locular; this cell is adnate for its whole length, upon a narrow fleshy connective and is affixed by one of its extremities to the point in the nerve of the filament before mentioned, always extrorsely. By the hippocrepiform curvature of the filaments the anthers become lodged in the 5 open cavities within the area of the concave disk, formed by the projecting winged angles of the style. Although there are 20 similar filaments, not more than 10 (sometimes only 5) bear anthers, the summits of the others being crumpled round the termination of their nerve. We may thus believe in the statement of Palisot on this point, which many botanists have doubted.

The disk which supports the floral parts is annular, narrow, prominently erect, crenulated on the margin, and placed around the deeply hollow vertex of the ovary, wherein the stigma is ensconced; the latter, peltately supported by a short, broadly 5-angular style, is large, depressed and pentagonal, hollow in the centre, with 5 radiating furrows on the flat summit, each terminating near the angles, in a gaping gland filled with stigmatic tissue.

The calyx consists of 5 equal, triangular sepals, which surround the disk, are valvate in æstivation, but afterwards quite rotate; they are thick, flat, with square margins, which end externally in a short mucronate point, on each side of which there is generally a distinct imbedded gland.

[1] Seeing them upon the second whorl, he says, "But just at the bend they often present a slight excrescence or fold, representing perhaps the traces of an anther" (Journ. Linn. Soc. vol. x. p. 495).

The inferior ovary is shortly turbinate, varying in the number of its cells. Beauvais figures about 20 radiating cells in his typical species. Jussieu, who reexamined the same plant, does not contradict this, but says he found four ovules in each of its cells. In *N. Heudelotii* the ovules are superposed in pairs. In *N. Whitfieldii* Dr. Lindley found the ovary to be 5-celled, with only 2 collateral ovules in each cell. In *N. Mannii* I saw several ovules in each cell superposed in pairs. One curious point of structure was noticed by Dr. Lindley in the ovary of *N. Whitfieldii* which had been preserved in spirits: the axis, round which the cells radiate, was hollow, in continuation of the hollow style; and an open foramen was seen leading out of that space into each cell, above the point of suspension of the ovules. He figures this in fig. 5 (Veg. Kingd. p. 728); and he describes, as shown in fig. 6, a depressed dark spot on each side of the ovule, which I have witnessed in another species—a circumstance to which I shall have to refer presently.

The fruit is subglobular, about the size of a small apple, deeply umbilicate at the summit, within which cavity are seen the persistent sepals, disk, style and stigma; it is indehiscent, with a coriaceous pericarp, not always very thick, and varying in the number of its cells.

The seeds are solitary, or 2 superposed in each cell, sometimes enveloped in a thin pulp, sometimes without pulp; they are obconically globose, and subangular by compression, or they are oblong, reniform, laterally compressed, exhibiting generally, in the deep ventral sinus, a broad oblong cicatrix, like that in the seeds of many *Sapotaceæ*, showing where they are agglutinated to the inner angle of the cell and to the sides of the dissepiments—an important feature not hitherto observed; the testa is thin and membranaceous, generally evanescent. The embryo consists of 2 equal fleshy plano-convex cotyledons, with a short radicle, which is hidden between them at the lateral sinus, where also a large centrifugal plumule lies concealed.

The several species described by authors are reduced to two by Messrs. Bentham and Hooker (Gen. Pl. i. p. 724), but they are amalgamated into one only by Prof. Lawson (Oliv. Afr. Fl. p. 439). It appears to me, on the other hand, from the characters given by different authorities, and from others indicated by the specimens in our herbaria, that several species may easily be recognized by the following data. The typical species comes from the kingdom of Benin, at Waree, on the river Escardos, where, in alluvial ground, it forms a small tree, 7 or 8 feet high. The species found by Heudelot in the high land of Foota Jalhoo, 1000 feet above the level of the sea, and 500 miles in the interior of the Senegal coast, is a tree with a straight trunk 25 to 33 feet high. Most of the other species grow near the sea-coast. Vogel's species has been found at the two extremities of the Gold Coast, at Cape Palmas, by Vogel, and at Lagos by Baxter. Whitfield's specimens were found by him at Sierra Leone and the river Nuñez, where it forms a shrub with the appearance of a *Camellia*, 5 to 7 feet in height. Mann's plant from Fernando Po is a tree 20 to 25 feet high. Mann's specimens from Old Calabar are very different, and form a smaller tree, only 10 to 15 feet high. Welwitsch states that his plants from the interior of Angola were obtained from a tree with a simple straight trunk, 12 feet high.

The leaves in Beauvais's plant are oblong, constricted at the summit into an obtusely

narrow acumen, at the bottom of which, on each side, is a broad tooth; they are acute and biglandular at the base, upon a very short petiole. In Heudelot's specimens they are narrower, subacute at the base, terminate at the summit in a simple narrow obtuse point, and they have a slender petiole. In Vogel's specimens they are more elliptic, with a narrow mucronate acumen, are more coriaceous, with undulating cartilaginous margins, where several dark spots are seen, indicating as many abortive teeth; they are pale above, yellowish beneath, biglandular near the short fuscous petiole, and have about 9 pairs of ascending nerves. In Whitfield's numerous specimens the leaves are longer, with a long, narrow acumen, are of a darkish green colour above, and of a peculiar lurid brown beneath, are subcoriaceous, with about 8 pairs of more patent nerves, rarely with basal glands, and have longer petioles. In Mann's plant, from Old Calabar, the leaves are nearly double the size of any of the preceding, are more oblong, suddenly contracted at the apex into a very long narrow acumen, below which is seen an obtuse tooth on each side, as in Beauvais's plant, but with the addition within it of a conspicuous gland; they are acute at base, with 2 glands near a very short dark-red thicker petiole; the margins are undulated and cartilaginous; and they have ten pairs of straight ascending nerves. In Mann's plant from Fernando Po the leaves are still longer (10 inches), broader at the base, terminating abruptly at the summit in a short simple obtuse acumen; they are more coriaceous, very pale, with an almost encaustic surface above, pale yellow, and subnitid beneath, rarely with basal glands, with 12 pairs of prominent diverging nerves, and short stiff fuscous petioles. In Welwitsch's plant from Angola the leaves are of median size, much more membranaceous, more elliptic, of a more opaque green on both sides, obtusely and distinctly toothed on their thin margins, without basal glands, with about 7 pairs of subascending nerves, have extremely short petioles, with their margins subdecurrent with the angles of the branches.

This constant difference in the leaves and habits of the plants is accompanied by equally marked peculiarities in the flowers and fruits, indicating the distinctness of the species. In the flowers the number of sepals is constantly 5 (except where, as rarely happens, they are reduced to four by abortion); the number of marginal lobes and rays of the corolla, the number of segments in the several whorls of the corona, vary in the several species, but they are always multiples of 5. The following table gives in columns the number of parts in the several whorls of the flower, and the relative dimensions of the calyx and corolla in the several species :—

Species.	Lobes and ribs of corolla.	Corona.				Relative diam. of calyx and corolla in lines.	
		Outer whorl.	Second whorl.	Inner whorl of filaments.	Anthers.	Calyx.	Corolla.
N. imperialis	35	35	35	20	10	8	18
N. Heudelotii.....	40	40		20	10	7	15
N. Vogelii	30	75	40	20	5	8	20
N. Whitfieldii	35	60	50	20	5	9	18
N. cuspidata	40	70	40	20		10	21
N. Mannii	30	40	40	20		11	13
N. angolensis.....	30	60	45	20	10	12	21

Those botanists who have advocated the amalgamation of the species, place little reliance on the colour of the flowers, which they say is variable; but Beauvais, Jussieu, Whitfield, and Welwitsch assert that the colours are constant; and this appears confirmed by the dried specimens. In *Napoleona imperialis* the corolla is of a beautiful ultramarine blue, the corona of a roseate colour. In *N. Heudelotii* the corolla is of a reddish purple, the corona of a pale rose-colour. In *N. Vogelii* the corolla is yellow, with a tinge of red about the base, the corona being yellowish white. In *N. Whitfieldii* the corolla is of a uniform apricot-colour for more than half its length, then suddenly red towards the base, the corona is yellow, the filaments of a rich crimson colour. In *N. Mannii* the corolla is only half the usual size; this, as well as the corona, is of a pale yellow, the filaments quite white. In *N. cuspidata* the corolla in the dried state appears of the same colours as in *N. Whitfieldii*, but the corona is of a deeper roseate hue. In *N. angolensis* the corolla is white, the corona is white, but the campanular base of the 2nd whorl is of a violet apricot-colour, and the staminal whorl of the same hue.

The fruit varies in size in the several species. In *N. imperialis* it is said to be spherical, with a softish pericarp about the size of a small apple, with many seeds imbedded in fleshy pulp. In *N. Heudelotii* it is figured as spherical, has a soft coriaceous pericarp 1 or 2 lines in thickness, with 5 thin persistent dissepiments, each cell containing 4 seeds in superposed pairs, of a shape very different from all others. In *N. Vogelii* the fruit is globular, somewhat depressed, obsoletely 5-lobed in the periphery; the pericarp is $2\frac{1}{4}$ inches in diameter, and $1\frac{1}{2}$ line in thickness, externally of a dark maroon colour, with pale spots, is about 10-celled, contains about 12 seeds, some of them slantingly superposed; and there is no appearance of pulp in the specimen preserved in spirits. In *N. Whitfieldii* the fruit is $2\frac{1}{2}$ in. in diameter, of a more depressed globular form, with a pericarp not thicker than a common card, of a pale rose-colour, with white spots, is very brittle when dry: it has apparently been 5-celled; but no remains of dissepiments were visible in the specimen in the British Museum. Whitfield says that the seeds are enveloped in an edible pulp. In *N. angolensis* the fruit much resembles that of the preceding in size and colour, but the pericarp is somewhat stouter, more firm, obsoletely 5-lobed on the periphery; in the dry state it seems to have been 5-celled, and the seeds have probably been enveloped in pulp.

These many differential characters, though long disregarded, are positive, and fully justify the maintenance of several good species. Up to 1845, indeed, three of them were acknowledged, when in that year Dr. Lindley proposed a fourth, upon Whitfield's specimens. In 1848, however, Sir Wm. Hooker, in figuring and describing the latter from a living plant, pronounced decidedly that it did not differ specifically from the original species, *N. imperialis*, or from Heudelot's plant; for he could discern no dissimilarity between the three plants, except that of colour, which was due solely to their fading in drying. This broad assertion so puzzled Van Houtte, that he wrote immediately to Prof. Decaisne, asking him to examine the typical specimens of Beauvais and Heudelot's plants in the Paris collections, in order to determine this point. The learned Professor [1]

[1] Flore des Serres, vol. iv., sub tab. 386, 387 (1848).

replied, that he had done so, and could not understand upon what ground the conviction of Sir Wm. Hooker rested, as the latter had evidently forgotten that the plants of the two French botanists were examined by them in their growing state, in localities far apart, the blue colour of the one and the purple of the other being noted by them on the spot (and not in the dried state), specifying the time of year they were thus seen in flower. M. Decaisne added that Sir Wm. had failed to notice several facts, such as the peculiar glands in the plants, the difference in the size of the fruits, the great dissimilarity in the seeds, the comparative size of the plants, and other characters; he concluded that, until he saw proof to the contrary, he should continue to regard Heudelot's plant as a species widely different from Whitfield's. He could not speak with equal certainty in regard to *N. imperialis* and *N. Heudelotii*; but Jussieu, in comparing these two plants, speaks decisively on this point [1], stating that their differences are so great that it is impossible to mistake one for the other. In the following year (1849) Mr. Bentham supported the view of Sir Wm. Hooker, and even went so far as to include *N. Vogelii* in the same category, thus amalgamating the four species into a single one, *N. imperialis* [2]; but in 1865 he somewhat modified this opinion by admitting the existence of two species [3]. Prof. Lawson afterwards reduced all the plants of *Napoleona* to a single species [4]. Since that time little fresh evidence has been offered on the subject, except the valuable information contributed by Dr. Masters in his excellent analysis of the living flower of Whitfield's plant [5], when he compared this evidence with the published details of other botanists. He pointed out many of the notable differences I have enumerated in the preceding pages, not only in regard to the flowers, but dissimilitude in the habit, in the leaves, fruit, and seeds; still he drew no inferences from them as applicable to the determination of the species; on the contrary, he says, "Whether all these plants belong to one variable species, or whether there are four or five distinct forms, is a question no one can answer at present" [6]. Notwithstanding this, as the differences are so many, so well marked, and so constant, I have ventured to employ them in the maintenance of the following species:—

1. Napoleona imperialis, Pal. Beauv. (non Hook.) Fl. Owar. ii. p. 32, tab. 78; DC. Prodr. vii. p. 530; Lam. Encl. Suppl. iv. p. 57; Dict. Sc. Nat. tab. 66; Reich. Exot. Bot. tab. 137; Sertum Bot. (Brux. 1828), tab. 4.; Van Houtte, Flor. des Serres, i. p. 1, tab. 1; Walp. Bot. Reg. vi. p. 408: arbuscula, ramulis tenuiter teretibus, glabris: foliis oblongo-ovatis, apice repente constrictis, et in acumen lineare obtusulum productis atque hic utroque latere dente obtuso munitis, cæteroquin integris, marginibus cartilagineis, supra viridibus, costa plana, nervis divergentibus utrinque 7, subtus fuscioribus, costa nervisque flavidis prominentibus, imo 2-glandulosis, petiolo limbo 30–35plo breviore: floribus axillaribus, 2–3, fasciculatis, sessilibus, quorum unico simul expanso cum 2 alabastris imo pluribracteolatis, bracteolis rotundatis; sepalis 5, acutis, apice extus 2-glandulosis; corolla orbiculata, rotata,

[1] Ann. Sc. Nat. 2me sér. ii. 226.
[2] Niger Flora, p. 361.
[3] Benth. & Hook. Gen. Pl. i. p. 724.
[4] Oliver's Afr. Flor. p. 489.
[5] Proc. Linn. Soc. x. p. 492.
[6] *Loc. cit.* p. 494.

pulchre azurea, rotata, margine crenulato, subtus nervis crassis subulatis radiantibus 35 donata; corona rosea, paulo minore, verticillo primo e segmentis 35 linearibus rotatis liberis, verticillo secundo e segmentis 35 linearibus imo in cupulam connatis, superne liberis, et centrum versus inflexis, verticillo interiore e filamentis 20 liberis, plano-linearibus, crebre uniseriatis, inflexis, quorum 5 antheriferis; pistillo generis: drupa globosa, apice umbilicata, sepalis stigmateque coronata, pluriloculari, plurisperma, seminibus in pulpa nidulantibus. In regione Benin, ad Waree: *v. s. in herb. Hook.* (*Beauvais*).

The above details are derived from the description of Beauvais, and from the incomplete specimen at Kew sent from the Paris Museum. The species is abundant in woods behind the royal residence on the river Escardos, growing to the height of 7 or 8 feet. The leaves are $4\frac{1}{2}$–6 in. long, 2–$2\frac{3}{4}$ in. broad, on a petiole 2 lines long: the calyx expanded is 8 lines in diam.; the corolla is 18 lines in diameter.

2. Napoleona Heudelotii, Juss. Ann. Sc. Nat. 2^{me} sér. ii. 227, tab. 4; Fl. des Serr. i. p. 2, tab. 2; Ann. Hort. (1822) tab. 10; Walp. Rep. vi. 408: *Napoleona imperialis*, var. *purpurea*, DC. Prodr. vii. 750: arbor ramis verticillatim horizontalibus, ramulis subtenuiter teretibus, subangulatis, brunneis, striolatis: foliis oblongo-ellipticis, imo subacutis, apice in acumen breve obtusulum sensim aut repente constrictis, margine integris, tenuiter chartaceis, utrinque pallide viridibus, opacis, et minute granulatis, subtus vix obscurioribus, nervis tenuibus supra immersis, subtus nervis pallidis venisque prominentibus, imo 2-glandulosis, petiolo fusco limbo 20plo breviore: inflorescentia præcedentis; corolla ejusdem formæ sed purpurea, margine crenata, nervis subulatis 40 radiantibus; corona rosea, verticillo exteriore e segmentis linearibus liberis 40 nervis corollæ alternis, verticillo 2do imo poculiformi, margine in lacinias 40 incurvas fisso; filamentis 20, antheris 10; stylo et stigmate generis; ovario infero, 5-loculari, ovulis in quoque loculo 4, collateraliter superpositis: drupa globosa, ambitu obsolete 5-loba, 5-loculari; seminibus in quoque loculo 4, superpositis et collateralibus, pulpa involutis, angulato-globosis, lateribus compressis, apice subcuneatis, emarginatis, et hinc ad axem affixis, testa tenui; cotyledonibus plano-convexiusculis, crassis, carnosis; radicula in sinu immersa, ad axem spectante. In Senegambia interiore: *v. s. in hb. Mus. Brit. et Hook.* Foota Jalhoo (*Heudelot*).

The Museum specimen was sent by Jussieu to Mr. Robert Brown, the other one to Kew, from the Paris collection, both collected by Heudelot under the circumstances mentioned in a preceding page. It forms a tree, which is rare, with a straight trunk about 30 feet high, growing in freshwater places on the elevated tableland of Foota Jalhoo, in ferruginous rocks. The axils of its slender branchlets are $\frac{3}{4}$–1 in. apart; the leaves are $3\frac{1}{2}$–$5\frac{1}{2}$ in. long, $1\frac{1}{4}$–2 in. broad, on petioles 2 lines long: of the three axillary buds, only a single flower is developed at the same time. The corolla, of a reddish purple colour, is $1\frac{1}{4}$ in. in diameter; the corona, of a rose-colour, is half that diameter. The drupe, marked with white spots, is $1\frac{3}{4}$ in. in diameter, $1\frac{1}{2}$ in. high, the coriaceous pericarp being $1\frac{1}{2}$–2 lines thick; it is 5-celled, containing 20 superposed seeds, which are 6–8 lines in

thickness, roundish, somewhat flattened on the sides by pressure, a little narrowed towards the point of their attachment at the axis, near which the radicle is embedded in the very fleshy cotyledons.

3. Napoleona Vogelii, Hook. et Planch. in Hook. Icon. tab. 799; Benth. in Niger Flora, p. 360, tab. 49; Walp. Ann. i. p. 475: ramulis tenuibus, pallide brunneis, sulcatis; foliis ellipticis, imo acutis, apice in acumen longum angustum sæpe callosum repente constrictis, subundulatis, ad marginem cartilagineum punctis fuscis obsolete serratis, chartaceis, supra pallide viridibus, opacis, nervis tenuibus semiimmersis, subtus fulvescentibus, opacis, nervis venisque prominentibus; sub lente crebre impresso-punctulatis, imo petiolum versus biglandulosis; petiolo tenui, fusco, subtus corruguloso, limbo 18plo breviore: inflorescentia consueta; sepalis 5, rarius 4, apice biglandulosis; corolla orbiculata, depresse concava, pro dimidia parte externa flava, interne sensim rubra, nervis 30 acute lanceolatis radiantibus extus granulato-pruinosis munita; coronæ flavidæ verticillo 1° e segmentis 75, anguste linearibus, liberis, radiantibus, verticillo 2° e segmentis 40 linearibus, pro dimidia parte in cupulam coalitis, marginem versus liberis et incurvatis; filamentis 20, consuetudine liberis et incurvis, antheris fuscis 10; ovario pluriloculari, ovulis perplurimis superpositis: fructu depresse subgloboso, ambitu obsolete 5-lobo, calyce coronato, fusco-purpureo, flavide maculato, 7–11-loculari; seminibus 12 vel pluribus in loculis solitariis, vel oblique superpositis, axi affixis, oblongis, compressis, ventre reniformi-sinuatis. In Africa occidentali: *v. pl. s. in hb. Hook.* Cape Palmas (*Vogel*), Lagos (*Baxter*, 20144); *v. fr. in Mus. Kew. in spiritu* (*Vogel*), *siccum* Sierra Leone (*Lee*).

Baxter's plant may prove to be distinct; but as it greatly resembles Vogel's in its characters, I have considered it identical. The acumen in the leaves of the former is longer and narrower, the leaves are longer and more acute at the base; and the two come from localities widely apart. The leaves are $3\frac{1}{2}$–4 in. (in Baxter's 5 in.) long, $1\frac{1}{2}$–2 in. broad, on petioles $1\frac{1}{2}$–2 lines long. The corolla is 20 lin. in diam.; when not expanded, and only half that size, it is of a pale yellow colour; when full-grown it is a bright red colour towards the base. The fruit is $2\frac{1}{4}$ in. in diam., 2 in. high, and is well represented in Hook. Icon., though somewhat larger than the specimens; there is no appearance of pulp, either when preserved in spirits or when dry; the dissepiments are more persistent than in any other species, where they are probably membranaceous and disappear with the pulp.

4. Napoleona Whitfieldii, Lindl. Gard. Chron. 1844, p. 780; Bot. Reg. vol. xxx. Misc. p. 77; Veg. Kingd. p. 728 cum icone; Van Houtte, Fl. des Serres, tab. 386, 387; Decaisne, Rev. Hort. (1853), p. 301, tab. 16; Schnizl. Iconog. ii. tab. 159. fig. 1 ad 8: *Napoleona imperialis*, Hook. (non Palis.), Bot. Mag. tab. 4387: ramulis verticillatis, patentissimis, pallide brunneis, rugulosis: foliis oblongo-ellipticis, imo subacutis, apice in acumen lineare obtusulum constrictis, integris, marginibus subcartilagineis, rigidule chartaceis, supra pallidissimis, sæpe encausto-cancscentibus, valde opacis, nervis paullo prominulis, subtus obscurioribus, brunnescentibus, opacis,

sub lente scabridule lepidotis et punctulatis, costa pallida nervisque prominulis, ad basin rarius 2-glandulosis ; petiolo fusco, canaliculato, limbo 16plo breviore : floribus axillaribus generis ; corolla rotata, subconcava, peripherio armeniaca, centro coccinea, subtus costis planatis 35 viridescentibus et scabridulis sensim acutis, margine in lobulos totidem crebre plicatulos incisa ; coronæ coccineæ series externa e segmentis 60 liberis anguste linearibus constat, series intermedia e segmentis 50 linearibus ad medium campanulatim coalitis apice liberis et incurvatis, series interna e filamentis 20 linearibus introflexis, imo in annulum brevissimum connatis, et hic ad discum elevatum crenulatum affixis ; antheris 10 ; ovario 5-loculari, ovulis 4–6 in quoque loculo collateraliter axi superfixis : drupa depresse globosa, pallide rosea, albide maculata, 5-loculari, pericarpio tenuissimo fragili ; seminibus paucis, oblongis, compressis, ventre reniformibus, in pulpa mucilaginosa eduli immersis. In Africa tropica : *v. s. pl. in herb. Mus. Brit.* Sierra Leone (*Whitfield*), Sierra Leone (*Afzelius*) ; *in hb. Hook.* Sierra Leone et Rio Nuñez (*Whitfield*) : *v. fr. s. in Mus. Brit.* (*Whitfield*).

Whitfield described this plant as like a camellia-bush ; and Lindley says it has a softish wood remarkable for its large medullary rays, with abundance of spotted vessels intermingled with acicular tubes of woody tissue, like those found in the germinating radicle of *Rhizophora*. In Whitfield's specimen from Rio Nuñez, the branchlets spread at right angles ; and Sir Wm. Hooker figures them as verticillated and horizontal. The axils generally are $\frac{3}{4}$–$1\frac{1}{2}$ in. apart ; the leaves are $4\frac{1}{2}$–$6\frac{1}{2}$ in. long, $1\frac{3}{4}$–$2\frac{1}{4}$ in. broad, on petioles 3–4 lines long, near which below a gland is seen on each side ; they are furnished with about 8 pairs of divergent nerves. The inflorescence, as in most of the other species, consists of 3 fasciculated flowers, almost sessile, on extremely short pedicels, which bear 4 small roundish decussately imbricated bracts, each 2-glandular. Of these 3 flowers only one is at first developed, the other two in the meanwhile remaining in the bud-state : the sepals are square on the edges, gradually narrowing into a wedge-shaped point, below which externally are 2 imbedded glands ; they are 3 lines long, 3 lines broad at the base, and are marked outside with many yellowish prominent granules ; they spread rotately to a diameter of 9 lines on the summit of the inferior turbinate ovary. The corolla is $1\frac{1}{2}$ in. in diameter. The fruit is $2\frac{1}{2}$ in. broad, $1\frac{1}{2}$ in. high, crowned by the persistent calyx and stigma, and there umbilicated ; it differs from all other species in its pericarp not being thicker than a thin card, in being very brittle ; it shows internally the slight vestiges of 5 dissepiments, which would seem to have been membranaceous ; for no traces of them are seen in the dried fruit, nor of the edible mucilaginous pulp in which the seeds are said to be enveloped. There are about 12 seeds, laterally compressed, 12 lines long, 7 lines broad, and $4\frac{1}{2}$ lines thick : the thin membranaceous testa decays in drying, leaving the embryo bare, except on the cicatrix on the ventral sinus, which is seen often on one side only, where the seeds have been collateral in each cell, and where they have been there attached on one side of the dissepiment.

5. Napoleona cuspidata, nob. : ramulis subvalidis, pallidis, costato-striatis : foliis majoribus, oblongis, imo obtusis aut subacutis, apice in acumen lineare longum glanduloso-mucronatum subito constrictis, marginibus undulato-crispatis, integris, sub

acumen dente magno obtuso medio subtus glandulifero utrinque munitis, subcoriaceis, pallidissimis, opacis, cum nervis tenuibus rectiuscule adscendentibus utrinque circa 10, venis transversis reticulatis, subtus fulvescentibus, subnitentibus, costa nervis venisque prominentibus, ad basin breviter revolutis et hic glandula parva notatis; petiolo semitereti, substriato, fusce rubido, limbo 60plo breviore: floribus 3, sessilibus, quorum 2 alabastris, et unico expanso, e gemma axillari imo bracteis 4 parvis rotundis decussatis biglandulosis munita ortis; sepalis 5, acutis, apice glandulis 2 signatis; corolla orbiculata, magna, extus nervis 40 lineari-lanceolatis, margine in lobos totidem breves crispatos secta, imo purpurea, marginem versus dilute flavida; coronæ verticillo exteriore in lacinias 70 radiantes diviso, his anguste linearibus, flavidis, e basi omnino liberis, quam corolla subbrevioribus, singulis vesicula parva effœta paullo supra basin extus munitis, verticillo intermedio depresse globoso, 40-nervio, nervis paullo supra basin vesiculis totidem parvis extus donatis, margine in lacinias 40 triplo breviores lineares obtusas inflexim conniventes scisso, verticillo interno e laciniis 20, a basi liberis, late linearibus, corollæ fere æquilongis, primum paullo erectis, versus medium inflexim descendentibus, apicibus obtusis sub stigma conniventibus, et hic anthera fertili oblonga fusca singulatim munitis. In Africa tropica: *v. s. in herb. Hook.* Old Calabar (*Mann*, 2272).

This plant, together with *N. Mannii*, has been referred to *N. Vogelii*, but differs from it in many salient characters. The axils of its thickish branchlets are $\frac{1}{2}$ in. apart; the leaves are 6–8$\frac{1}{2}$ in. long (including the acumen 1 in. long), 2–2$\frac{3}{4}$ in. broad, on a petiole 1–2 lines long. The calyx expanded is 10 lines across, its thick sepals being 3 lines long, 2$\frac{1}{2}$ lines broad at their base; the corolla is 1$\frac{3}{4}$ in. in diameter; its nerves, not very prominent below, touch each other at their base, terminating acutely in the middle of the peripheral lobes. The 70 segments of the external whorl of the corona are 6 lines long, $\frac{1}{4}$ line broad, their prominent effete vesicles forming below a conspicuous moniliform ring 1 line beyond their base: the 40 segments of the second whorl, if free, would be as long as those of the external whorl; but they are confluent for two thirds of their length into a depressed globe, their free portions connivent at the centre, and the underpart of this globe not far from its base shows a prominent moniliform ring of 40 vesicles, similar to those of the outer whorl: the 20 free segments of the inner whorl are 7 lines long, 1 line broad, incurved as above mentioned, each furnished extrorsely near its apex with an adnate oblong fertile anther, these all crowding round the stigma. The style is extremely short and pentagonoid; the peltate pentagonal stigma, 5 lines broad, has 5 glandular spots near its angles, and scarcely rises above the level of the disk; the inferior ovary is compressedly turbinate, 5-celled, with several ovules in each cell, radiately attached to the projecting placentæ on the axis. The fruit is unknown.

6. Napoleona Mannii, nob.: ramulis subvalidis, pallidis, sulcato-striatis, epidermide resiliente: foliis majoribus, oblongis, imo obtusis vel rotundatis, apice in acumen subbreve obtusulum repente constrictis, marginibus undique integerrimis, subundulatis, rigide chartaceis, supra pallidis, valde opacis, sæpe cano-encaustis, nervis longe adscendentibus, subimmersis, subtus pallide fulvis, subnitentibus, minute

impresso-punctulatis, costa nervisque prominentibus, venis transversis et prominulis, imo sæpius eglandulosis; petiolo fusco, canaliculato, ruguloso, limbo 48plo breviore: flore solitario, breviter pedicellato, e gemma bracteolata axillari orto, pro genere parvo; sepalis acutis, sub apicem biglandulosis, extus pallide viridibus, pruinosis, intus flavidis; corolla undique flava, extus pruinosa, cum nervis obsolete costæformibus circa 30, in lobos totidem marginales rotundatos desinentibus, ambitu sepalos vix excedente; coronæ albæ verticillo exteriore e laciniis 40 anguste linearibus, e basi liberis, corollæ æquilongis, imo annulo moniliformi vesicularum signato; verticillo intermedio imo cupulari et hic annulo monilformi munito, pro tertia parte in lacinias 40 angustas incurvas centro conniventes diviso; verticillo interiore in lacinias 20 lineares complete introflexas secto, apicibus anthera oblonga fertili munitis, circa stylum conniventibus; stylo et stigmate ut in charactere generis. In insula Fernando Po: *v. pl. sic. in hb. Hook.* loc. cit. (*Mann*, 590).

A species differing from all others in its much larger and more rigid leaves with a very pale encaustic surface, in its solitary flowers, only half the size of any of the others, of a uniformly pale colour, furnished with a white corona peculiar in the number of its parts. It forms a tree 20–25 feet high, with branchlets $1\frac{1}{2}$ line thick, with axils 1 in. apart; its leaves are 10 in. long, 4 in. broad, on a petiole $2\frac{1}{2}$ lines long. The pedicel of its single flower is $\frac{1}{2}$ line long; the acute sepals are 4 lines long, 3 lines broad at their base; the corolla is 13 lines in diameter. The segments of the first whorl of the corona spread to a diameter of 13 lines; the diameter of the globular contour of the second whorl 8 lines. The fruit is unknown.

7. Napoleona angolensis, Welw. MSS.: ramulis teneris, pallidis, 4-angulatis, rugulosis: foliis elliptico-oblongis, imo subobtusis, apice in acumen subbreve vel longius obtusulum subito constrictis, marginibus distincte et undique crenato-serratis, membranaceo-chartaceis, supra viridibus, subopacis, nervis divergentibus semiimmersis, subtus pallidioribus, costa nervis venisque reticulatis prominulis; petiolo supra canaliculato, subtus valde corrugato, limbo 30plo breviore: floribus in axillis 3, e gemma ortis, quorum 2 alabastris, 1 expanso; pedicello vix ullo, imo decussatim bracteolato; sepalis 4 vel 5, acutis, apice 2-glandulosis, extus viridibus, intus flavescentibus; corolla late orbiculari, membranacea, subtus nervis 30 subulatis prominulis pallide pruinosis signata, ambitu in lobulos totidem rotundatos lacinulatos incisa, (sec. cl. Welw.) omnino nivea (sicca flavescente); coronæ verticillo exteriore e laciniis 60 liberis albis, anguste linearibus, acutis, imo tenuioribus, corolla dimidio brevioribus, singulis subtus vesicula minima munitis; verticillo intermedio pro dimidia parte cupuliformi, extus annulo moniliformi vesicularum instructo, margine in lacinias lineares 45 inciso, his introflexis, centro conniventibus; verticillo interiore e laciniis 20 late linearibus, liberis, introflexis, apicibus anthera fertili donatis, stylum circumstantibus: drupa sicca, depresse globosa, sinuato- 5-sulcata, pericarpio tenui, coriaceo, fragili, pallide rubidulo, punctis parvis flavidis immersis maculato, sicco uniloculari, intus septorum 5 vestigiis signato; seminibus reniformi-oblongis, subcompressis. In Angola: *v. pl. s. in hb. Welwitsch*; *v. fr. s. in Mus. Brit.* (*Welwitsch*).

A very distinct species, marked by peculiar characters. It forms a slender tree, 12 feet high, with a trunk 1–2½ in. thick, and with slender branchlets; its leaves, remarkable for their serrated margins, are generally 5 in. long, 2–2¼ in. broad, with about 7 pairs of nerves. Flower generally solitary, about the size of that of the typical species: the calyx expanded is 1 in. across from point to point; the sepals 4 lines long, 3 lines broad at their insertion round the disk, which is 3 lines in diameter; the corolla is 1¾ in. in width, or 9 lines long from the line of its attachment to the circumference: the segments of the outer whorl of the corona are 4½ lines long, ½ line broad; the total length of the half-confluent segments of the intermediate whorl is 8 lines, the free portion being one half of this, or 4 lines; the segments of the inner whorl are 6 lines long, 1 line broad: the fertile anthers 2 lines long. The fruit is 2¼ in. in diameter, 1½ in. high: the seeds are 1 in. long, 7 lines broad, 4½ lines thick; they are of a pale red colour, with close yellow immersed glands; the transverse short radicle is completely embedded within the substance of the cotyledons, close to the ventral sinus, which have no chink there, as in *N. Whitfieldii*. The tree was found in dense woods at Quitapo (Omnengue), between Ndelle and Rio Zuinha, in flower in May 1856, and in fruit at the end of June of the same year.

After this critical examination of the several species, we can perceive nothing, either in the floral or carpological structure of *Napoleona*, that bears the slightest analogy to the *Myrtaceæ*; it is equally irreconcilable with the *Barringtonieæ* and the *Lecythidaceæ*. In order to trace its real affinity, we will compare with it *Omphalocarpum*, a genus derived from the same vicinity.

2. Omphalocarpum.

This genus was first discovered by Palisot de Beauvais in 1787, in the same province where he found *Napoleona*; but it was not described and figured till 1804[1], when he pointed out its affinity with *Sapotaceæ*. All botanists since that time have accorded in this view[2]; but in 1862 Messrs. Bentham and Hooker, without adducing reasons, placed the genus in *Ternstræmiaceæ*[3], and subsequently Prof. Oliver followed their example[4]; but notwithstanding such high authorities, I venture to think there is little in its structure conformable to that family, and an overwhelming amount of evidence to show that it is truly Sapotaceous. It forms lofty trees, with erect trunks; the leaves, not large, are approximated at the ends of the branches; the inflorescence generally issues out of the main trunk, or appears on the bare branches, rarely in the axils; the flowers, 3 to 6, usually spring from bracteolated tufts, and are mostly pedicellated, but in one species they are sessile; they are not very large, and are perhaps hermaphrodite in the typical species, but in the others they are more or less polygamous, as in other *Sapotaceæ*[5]. Of this we have parallel examples in that family where there is an

[1] Fl. Owar. i. p. 6, tab. 5 et 6.

[2] Lam. Dict. Suppl. iv. 140, tab. 966; Brown, Prodr. p. 529; DC. Prodr. viii. 207; Endl. Gen. p. 741; Lindl. Veg. Kingd. p. 591; Hook. Niger Flora, p. 441.

[3] Gen. Plant. i. 185.

[4] Flor. Afr. 171.

[5] Miq. Monogr. Sapot. in Mart. Fl. Bras. fasc. xxxii. p. 38, where he says "flores *fere* semper hermaphroditi."

exuberant production of flowers, as in *Mimusops*. The sepals are 5, roundish, subcoriaceous, very imbricated, the 2 exterior nearly concealing the others in æstivation, as in *Sapotaceæ*. The corolla is described by DeCandolle[1] as gamopetalous and infundibuliform, deeply cleft into 6 or 7 distinct segments: this, however, is not a correct definition; for in reality there are 5 petals (in one species more), all furnished with cuneiform claws, which are firmly agglutinated upon the outer surface of a funnel-shaped thin disk, leaving the upper and broader portions apparently as so many free segments, which are erect, oblong, and somewhat imbricated on the margin: the proof of this is clearly shown on examining the outside of the tube, where we see the margins of the claws free, like so many very narrow wings, extending to the base, leaving narrow portions of the bare disk visible between them. The disk, as above shown, is tubular, as long as the claws of the petals, and agglutinated to them, just as occurs in *Mimusops* and *Lucuma*; and in like manner it supports upon its margin 5 sets of stamens, nearly the length of the free portion of the petals, and placed opposite to them in a single series; their filaments are straight and slender, very pointed and recurved at the summit, where they support each a versatile anther, composed of 2 long collateral cells, divergent at the base, and fixed extrorsely upon a fleshy connective, which is uncinately excurrent at the apex; if we cut this anther in its young state transversely, it appears 4-celled; but as the dehiscence takes place in the deep furrows, it is seen to be only 2-celled, each cell containing 2 parallel masses of cohering pollen grains; after bursting they become separated, then appearing oval and reticulated: the same number of filaments, similar in every respect, are seen in the ♂ and ♀ polygamous flowers, but they are antheriferous in the former and bare in the latter. Between these sets of fertile stamens, and alternate with the petals, are seen as many processes, strap-shaped below, widening upwards, where they are flabellately laciniated into about 7 setaceous segments, the middle one longest, attaining the length of the fertile stamens; these exactly resemble the so-called staminodes found in *Mimusops*, *Lucuma*, and *Dipholis*. The ovary is superior; in the ♂ flower it is rather small, orbicular, fixed on a short stipitate support, depressed above, where it is marked by many radiating grooves, bearing in the centre an erect slender style, reaching the anthers, and terminated by a small many-lobed hollow stigma; it contains an irregular number of cells, each with a small ovule, probably all abortive; in the ♀ flower the ovary is larger, and fixed on a stipitate support, is many-grooved, and expands above gradually into a stout conical coriaceous style (as long as that of the ♂ flower), obtuse at the summit, where it is hollow and many-lobed: when this style is cut transversely, we see there as many distinct channels as there are cells in the ovary, and descending into them; there are about 24 cells, radiating from a hollow central axis, with a single ovule in each cell, horizontally attached: all this agrees with the structure of *Mimusops*. The fruit is large ($4\frac{1}{4}$–$8\frac{1}{2}$ in. in diam., sometimes much larger), of a very depressed orbicular form, radiately sulcated, umbilicated in the centre by a large hollow space, in the bottom of which the persistent style is seen: the indehiscent pericarp is $\frac{1}{2}$–1 inch in thickness; the epicarp is hard and subligneous: the mesocarp, composed of many distinct, ovoid, subcompressed, grumous concretions (as in *Labatia*), like the nodules of a mineral con-

[1] Prodr. viii. 287.

glomerate, irregularly interwoven in two series; these nodules are easily separable in the fresh state, but afterwards become solidified and compact: the central space is divided into about 20 narrow cells by dissepiments, which radiate around a large hollow orbiform ligneous axis, which is internally smooth and polished: the placental angle of each cell thus inclines upwards and outwards, and bears a single seed attached to it by a long linear caruncle or scar. This seed is oblong, very compressed, much thinner towards the margins, rounded on three sides, but straight along the whole ventral edge, and there marked by a pale opaque soft caruncula, as in *Sapota*, where it is called by DeCandolle the umbilicus, but by Gaertner the umbilical area, to distinguish it from the true umbilicus always seen on one of its extremities, as figured in his plate 203, and so described in his text under *Lucuma*, *Sapota*, *Chrysophyllum*, *Sideroxylon*, *Mimusops*, and *Imbricaria*; in the present instance the hilum is seen at its lower extremity, like an oval hole divided by a septum, the remaining part being filled with the ascending raphe, terminating at the opposite extremity in a small foramen, which it perforates to terminate in the apical chalaza. The testa is polished externally, is rather thick, very hard, osseous, dark brown, expanded at each ventral angle into a short hooked rostrum, the lower one marked by a transverse chink (the micropyle); the inner integument is brown, chartaceous, and adheres firmly to the inside of the testa. In the only seed I was able to examine, the thinnish albumen alone was present, the enclosed embryo being abortive or decayed; but this is well figured by Palisot, who figures it as consisting of 2 large thin foliaceous cotyledons, united at their base by a small inferior radicle.

The genus is thus seen to agree remarkably with *Sapota* in the structure of its flower, of its fruit, and especially in that of its seeds; indeed it differs from the latter only in its large umbilicated fruit with a hard ligneous pericarp, having a large hollow axis. I will here record the two following species.

1. Omphalocarpum procerum, Pal. Beauv. Fl. Owar. i. p. 6, tab. 5 et 6; R. Brown, Prodr. p. 529; Poir. Dict. Suppl. iv. p. 140, tab. 966; DeCand. Prodr. viii. 208: arbor comosa, trunco altissimo, ramis patentibus, ramulis diffusis: foliis alternis, sessilibus, lanceolatis, integris, glabris, supra nitidis: floribus solitariis vel pluribus fasciculatis, sessilibus, e trunco nascentibus, hermaphroditis?; sepalis 10 (quorum 4–5 forsan bracteis?), valde imbricatis, ovato-rotundis, concavis, extus sericeo-villosis; petalis 6–7, oblongis, margine undulatis, glabris, imo longe unguiculatis, unguibus ad discum tubulosum perigynum petalis triplo breviorem agglutinatis, corolla hinc pseudo-monopetala; staminibus in phalangibus 6–7 petalis oppositis margini disci insertis, filamentis tenuibus, antheris oblongis, cum connectivo subulato exserto; staminodiis 6–7, singulatim inter quidque petalum disco insertis, petalis 3plo brevioribus, oblongis, membranaceis, margine fimbriatis; ovario supero, depresse globoso, multiloculari; stylo subulato-tereti, petalis breviore, persistente; stigmate capitato, aspero: fructu permagno, indehiscente, orbiculari, valde depresso, plurisulcato, apice profunde umbilicato, extus turgide tuberculato; pericarpio duro, crasso, e concretionibus majusculis confecto, radiatim pluriloculari; semini-

bus in loculis solitariis (pulpa involutis?), oblongis compressis, margine ventrali caruncula lineari signatis, angulis ventralibus singulis rostratis; embryone oblongo, in albumen tenue subæquilongum immerso, cotyledonibus 2 magnis foliaceis ellipticis, radicula parva infera. In Africa occidentali (Upper Guinea) ad Buonopozo, regione Galbar ultra regnum Owariense, a cl. auct. lectum (non vidi).

According to Palisot, this is a tree with a lofty straight trunk, 60–80 feet high, of which he gives a diminished drawing: the size and exact contour of the leaves are not given, only that they are lanceolate, and therefore different from the specimens in the Kew herbarium from the Camaroons and Old Calabar. The flowers also differ from those of the latter in being hermaphrodite, sessile, and pentamerous; the sepals sericeously villous; they are 1 inch long. The fruit is large, often 12 inches in diam.; the seeds are 1 in. long, $\frac{1}{2}$ in. broad. From Palisot's ample generic character, there is nothing that can lead us to suppose that the flowers are otherwise than hermaphrodite.

2. Omphalocarpum elatum, nob,: *Omphalocarpum procerum*, Oliv. (non Palisot), Afr. Flor. i. p. 171: ramulis apice foliiferis, deorsum nudis, axillis approximatis: foliis oblongis, imo longe spathulatis, apice rotundiusculis, vel sensim obtusatis, majusculis, integris, marginibus subrevolutis, rigide chartaceis, glaberrimis, supra rufescenti-viridibus, subpruinoso-opacis, costa planata, griseo-pruinosa, striolata, nervis divergentibus arcuatim nexis, prominulis, subtus ferrugineo-opacis, costa prominente, nervis flexuosis prominulis, venis transversim reticulatis; petiolo brevissimo, late concavo, fusco: floribus 5–6, e nodo bracteolato trunco innascenti-fasciculatis, pedicellatis; sepalis semper 5, ovatis, concavis, pedicello æquilongis, valde imbricatis, quorum 3 exterioribus subglabris, crassioribus, 2 intimis submembranaceis, cano-tomentellis; corolla flava structura præcedentis, sed petalis phalangis et staminodiis semper 5: staminibus in quaque phalange uniseriatim 6, petalis oppositis, et iis dimidio brevioribus, erectis, apice subito reflexis; antheris supra medium affixis, extrorsum collateraliter 2-lobis, acute oblongis, connectivo excurrente; ovario depresse globoso; stylo subulato; stigmate capitato; in ♀ ovario imo breviter stipitato, cylindrico, pluriloculari, stylo cum eo continuo obconice cylindrico, stigmate annulari vacuo pluridenticulato dentibus cum styli canalibus ovariique loculis congruentibus: fructu forma præcedentis, sed dimidio vel duobus trientibus minore, extus sublævi (vix tuberculato), 24-loculari; seminibus similibus. In Africa occidentali: *v. pl. s. in hb. Hook.* ♂ Bagroo river (*Mann*, 815), Old Calabar (*Thomson*, 128); ♀ Camaroon river (*Mann*, 712): *v. fr. s. in Mus. Kew.* Camaroon river (*Mann*).

A species very distinct from the preceding; its height is unknown. In Mann's specimen from Bogroo river the leaves are broader, 5–9 in. long, $2\frac{1}{4}$–$3\frac{1}{4}$ in. broad, on a petiole 2 lines long; those of Mann's two specimens from the Cameroons are 5–9 in. long, $1\frac{1}{4}$–$2\frac{1}{2}$ in. broad. Thomson's specimen consists of a single leaf, $9\frac{1}{2}$ in. long, $2\frac{1}{4}$ in. broad, cuneate at base, where it is $\frac{1}{2}$ in. broad, without a petiole: it belongs probably to

a different species. The flowers are nearly 1 inch long; the sepals are 4 lines long, 3 lines broad; the funnel-shaped disk 4 lines long, the claws of the petals glued to it are of the same length, their free portions above being 7 lines long, 3 lines broad; the filaments in both sexes are slender, erect, 5 lines long; the anthers 2 lines long, acute above, cordate at the base, being fixed behind at the sinus to the recurved apex of the filament, standing extrorsely. The fruit in one case is $4\frac{1}{4}$ in., in the other $5\frac{1}{2}$ in. in diameter, and 3 in. high, the pericarp being 10 lines in thickness, and composed of conglomerate nodules, as is well described by Beauvais; the seeds are $1\frac{1}{2}$ in. long, 1 in. broad, and 4 lines thick in the middle.

It is thus seen that the structure of its flower resembles that of *Mimusops*, differing only in its isomerous petals, in the greater number of its fertile stamens, and in their greater length; it comes close to *Sapota*, especially in its fruit and seeds; and here it will find its proper place.

If we now carry out our proposed comparison between the structures of *Napoleona* and *Omphalocarpum*, we discern many points of singular analogy. They both come from the same region. They have an inflorescence in which the fasciculated flowers grow out of bracteolated nodules, a calyx of 5 sepals, a corolla perfectly monopetalous in one case, pseudo-tubular in the other, both furnished inside with separate phalanges of fertile stamens having extrorse anthers; phalanges of sterile stamens alternately placed in one case, concentrically disposed in the other; a plurilocular ovary, with one or two ovules in each cell; an indehiscent plurilocular fruit, orbicular, depressed, and umbilicated in the apex; and what is more remarkable, they both possess the very unusual character of a hollow axis, causing the placentæ to become inclined, with a solitary seed in each cell, attached to it by a ventral scar common to all *Sapotaceæ* (the "umbilical area" of Gaertner), a soft place which is probably only an expansion of the raphe. But, on the other hand, the differences are so great between the two genera as absolutely to prevent the admission of *Napoleona* into the *Sapotaceæ*; it differs in its sepals with valvate æstivation, a completely monopetalous corolla, in having its staminodes arranged in concentric whorls (although *Dipholis* has phalanges of 3 staminodes arranged concentrically in a double series); it has an epigynous (not a perigynous) disk, an inferior (not a superior) ovary and fruit, exalbuminous seeds (though these occur in *Lucuma* and *Labatia*). If, then, *Napoleona* cannot be admitted into the *Sapotaceæ*, and there is no other natural order in which it can possibly find a place, it must remain the monotypic representative of a distinct family, the *Belvidiaceæ*, as originally maintained by Brown and Lindley, excluding, however, *Asteranthos*. This family, though now consisting only of a single genus, must be placed in juxtaposition with the *Sapotaceæ*; and it is highly probable that other forms closely allied to it may be found in the forests, so full of rich vegetation, in the yet unexplored regions of tropical Africa.

3. Asteranthos.

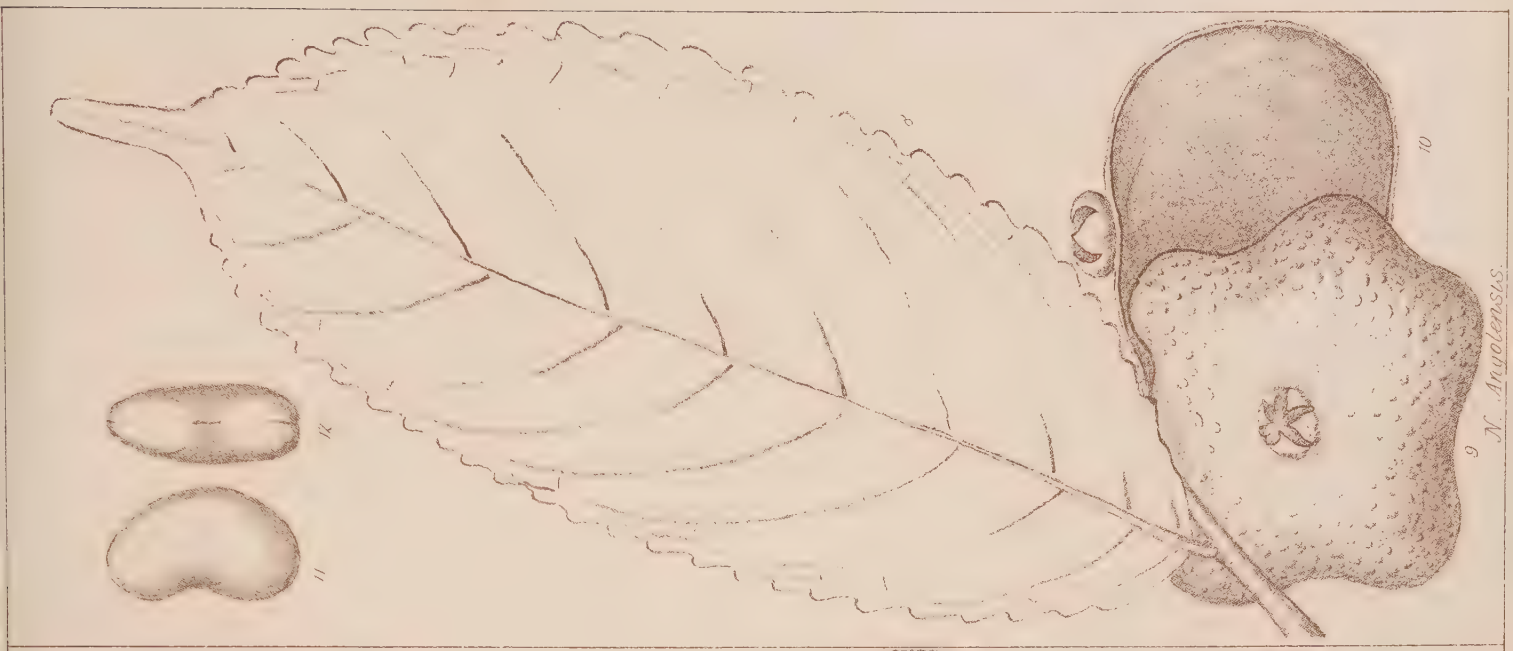
Although this genus has been associated hitherto with *Napoleona*, it will be shown that it does not bear the smallest affinity with it. It is entirely of South-American

origin, and, excepting the contour of its corolla, it presents quite another aspect, and a floral structure different in every respect. Only one species is recorded.

1. Asteranthos brasiliensis, Desf. Mém. Mus. vi. p. 9, tab. 3; D'C. Prodr. vii. 551.
In Brasilia et Venezuela: *v. s. in hb. meo et alior.* Rio Guainia (*Spruce*, 3500).

The plant above quoted is one of the gems of Dr. Spruce's invaluable collection; it was found by him on the banks of the river Guainia, the main branch of the Rio Negro, about 60 miles within the confines of Venezuela, and therefore not in Brazilian territory. It is probably a species distinct from Desfontaine's; for the latter has smaller leaves, larger flowers, a broader and deeper calyx, more resembling "the cup of an acorn," has much longer stamens, an ovary said to be inferior, with a 6-rayed vertex, and a stouter style and stigma. Spruce's plant is apparently a shrub, with upright alternate branches, the axils being $\frac{3}{4}$ in. apart; alternate leaves, oblong, subacute at base, with a long, narrow, obtuse acumen, their undulated margins subrevolute, especially towards the petiole; they are dull above, with nerves wholly immersed, pruinosely opaque and paler beneath, veinless, with a slightly raised midrib; $2\frac{3}{4}$–$3\frac{1}{4}$ in. long, 1–$1\frac{1}{4}$ in. broad, on petioles 1 line long. The inflorescence consists of a solitary flower in each axil, articulated on a short gemmiform nodule, bearing a minute bract; the pedicel is slender, erect, 9 lines long; the calyx is orbicular, very depressed, $1\frac{1}{2}$ line broad, 5 lines in diameter, its concave margin cut into about 16 blunt short teeth, each terminating in a curving bristle. The corolla is a circular, depressed, membranaceous cup, plicated in æstivation, as in *Cordia*; expanded, it is $2\frac{1}{4}$ in. in diameter, with an upturned margin, divided into 24 short roundish teeth, sparsely and setosely ciliated on their margins, and they correspond with as many fine nerves radiating from the centre, the intervening spaces being reticulated with fine veins; it is of a dull yellow colour when dry; it is attached by its perforated centre to the margin of a narrow, circular, annular, epigynous disk, 3 lines in diameter. The disk supports very numerous stamens, all quite free from the corolla, in three or four series of different lengths; the very close slender filaments are straight, the outer series 3 lines, the inner row 2 lines long, each bearing a linear-oblong, 2-celled anther, bursting by lateral sutures, introrsely and dorsally fixed on the curving apex of the filament, a little above the base; the ovary is quite superior, rising within the disk in a conical deeply 8-ribbed vertex, surmounted by a subulate slender style, 3 lines long, terminating in a capitate hollow stigma, with an 8-toothed margin; the ovary has eight cells opposite the ribs, each with a prominent placenta emanating from the axis, and charged with several collateral ovules, arranged in about three superposed series, with the raphes of the anatropous ovules facing each other. The fruit is unknown.

This structure is so widely different from that of *Napoleona* that *Asteranthos* cannot possibly remain in contiguity with it; the calyx is quite dissimilar in form, and has another æstivation; its flower presents no trace of the corona which forms such a peculiar feature in *Napoleona*; there is no analogy in the form, structure, or position of the stamens; the ovary is superior, with a long slender style, and an extremely dissimilar stigma; in fine, there is no single point of resemblance of its parts except in the orbicular shape of its corolla, an adventitious feature of weak value (insufficient to establish any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N. Angolensis.
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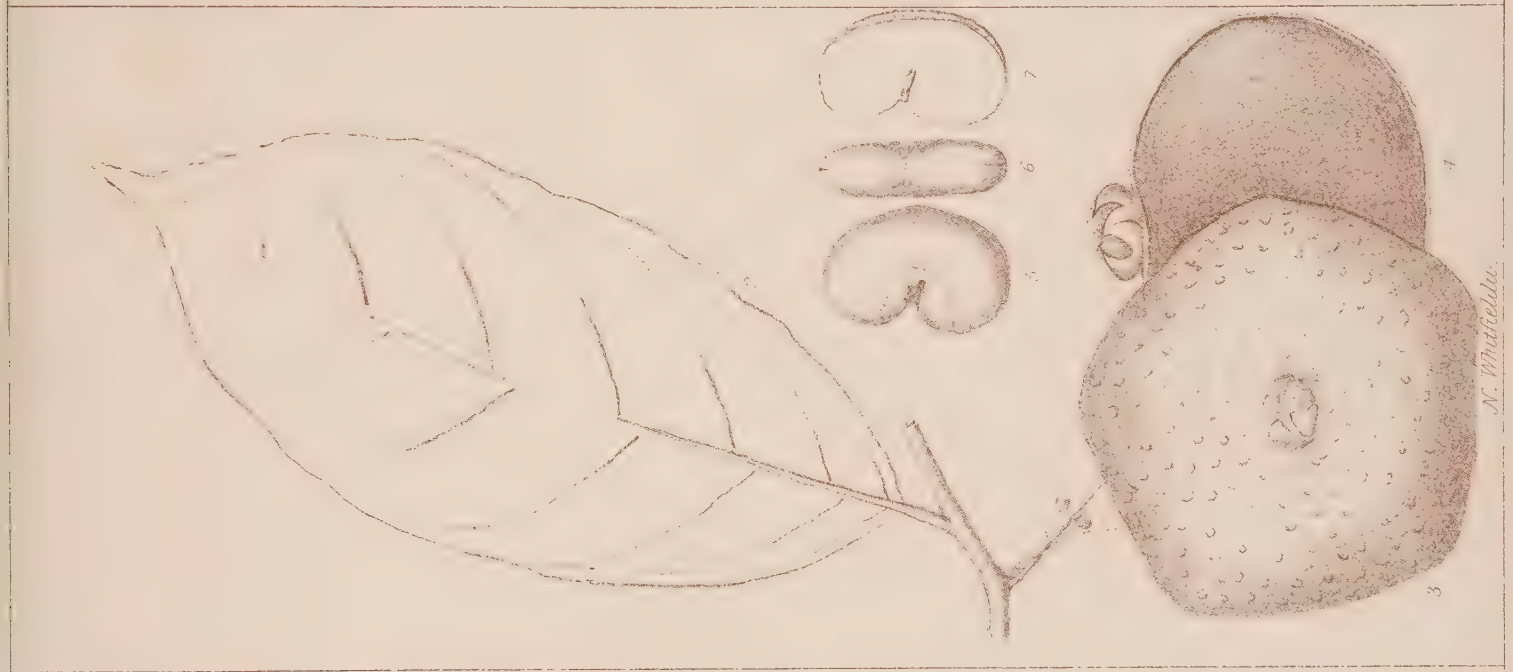
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N. Whitfieldii.
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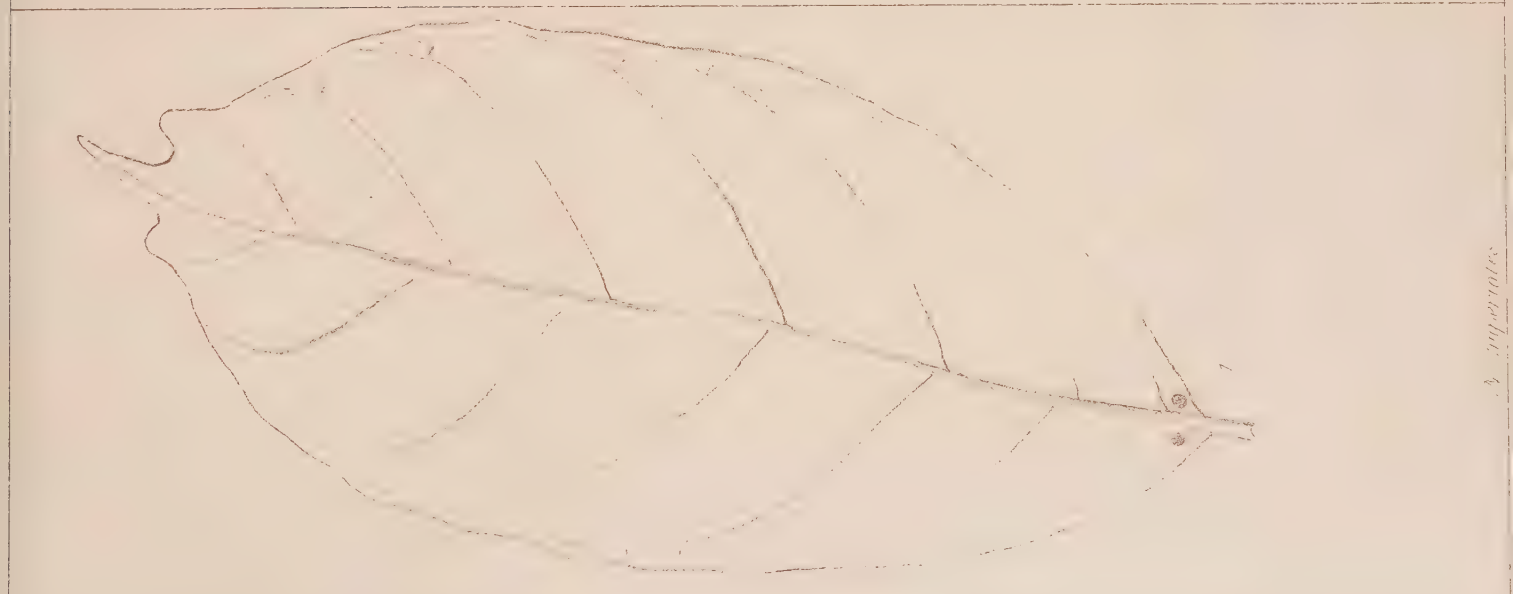

1
N. imperialis.

claim to affinity), and even there it is constituted very differently; for in *Asteranthos* its texture is that of an ordinary monopetalous corolla, simply marked by several delicate nerves, with intervening reticulated veins, as, for instance, in the campanular corolla of some species of *Cordia*, which have a very similar æstivation.

Searching among the many genera with a monopetalous corolla, we come upon *Rhododendron*, where we find many unexpected points of resemblance. *Asteranthos* has precisely the calyx figured by Wight (in his Icones, pl. 1203) of *Rhododendron Griffithsianum*; that species has a broad campanular corolla, with many longitudinal nervures, and is divided on its margin into several teeth; the tube is plicated with a similar æstivation; though its stamens are more numerous, they have similar long slender filaments, seated on a thin disk, free from the corolla, and similarly formed anthers; it has a superior conical ovary, of the same shape, marked in like manner by salient ridges, corresponding with the number of the cells, a similar long slender style, and a remarkably similar stigma. There would be no difference in the anthers if, in *Rhododendron*, the apical pores were continued in a slit along the remainder of the sutures, as, indeed, actually occurs in *Azalea*, where their dehiscence is like that in *Asteranthos*; other points of analogy are found in the arborescent species of *Rhododendron*, where the leaves are as frequently alternate as they are opposite, and where the large flowers are, in like manner, seated upon long, slender, solitary pedicels, bracteolated at their base. There is nothing, therefore, to separate this genus from others of the *Rhododendreæ*, except a more rotate corolla, with more numerous and shorter lobes. When the fruit is known, other analogies may be found to exist; but under our present knowledge of the structure of *Asteranthos*, it may safely be regarded as a member of the tribe just mentioned. It may be added that *Rhododendron maximum*, with a large, almost rotate corolla, is a native of South Carolina, a circumstance which renders the relationship more complete.

DESCRIPTION OF THE PLATES.

Plate I.

Fig. 1. A leaf of *Napoleona imperialis*, from a specimen sent by Palisot de Beauvois to Rob. Brown.
2. A leaf of *Napoleona Whitfieldii*, from Whitfield's specimen.
3. A fruit of the same species, from Whitfield's collection.
4. The same in longitudinal section, to show its thin pericarp.
5. A seed from the same, seen on its face.
6. The same, shown on its edge.
7. One of its cotyledons seen on its inside face, showing the radicle and plumule half immersed in it.
8. A leaf of *Napoleona angolensis*, from Welwitch's specimens.
9. A fruit of the same species.
10. A longitudinal section of the same, showing its thin pericarp.
11. A seed belonging to the same, shown on its face.
12. The same, seen edgeways.

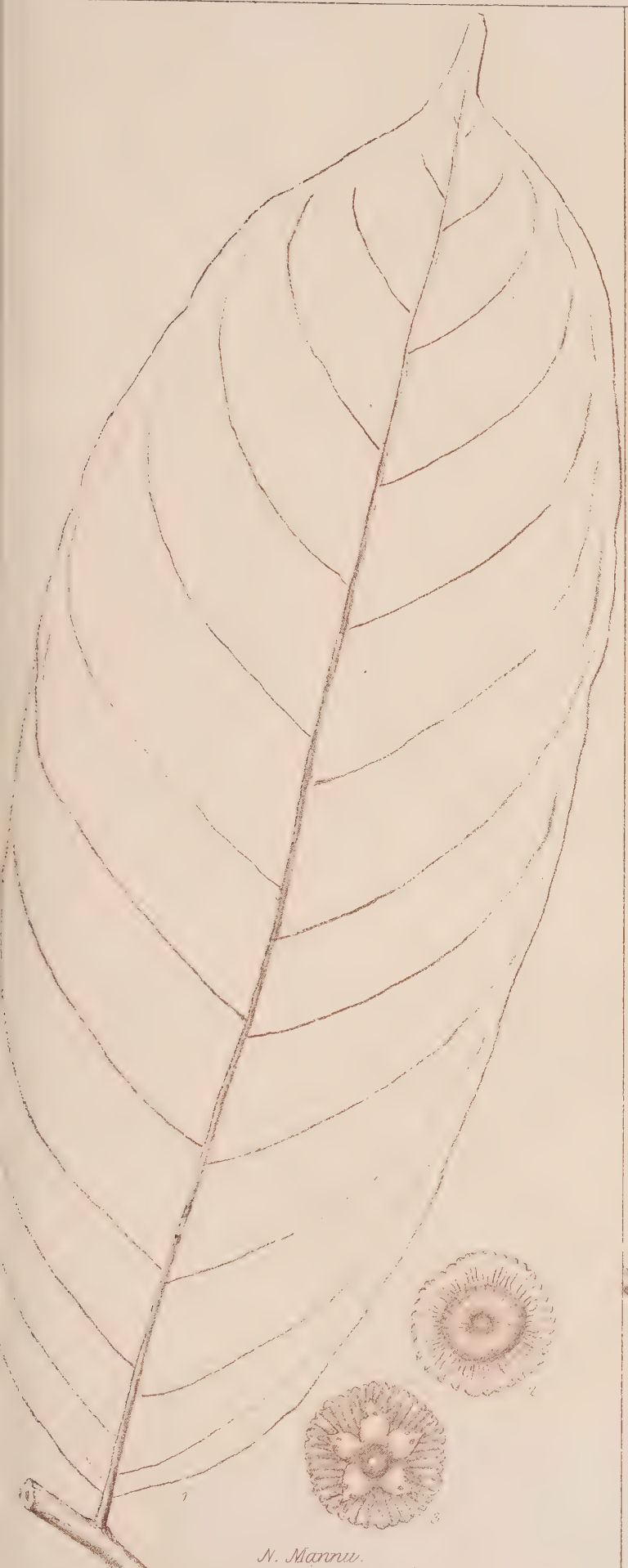
Plate II.

Fig. 1. A leaf of *Napoleona Mannii.*
2. A flower of the same, viewed from above.
3. The same, as seen from beneath.
4. A leaf of *Napoleona cuspidata.*
5. A flower of the same, viewed from above.
6. The same, as seen from beneath: *all nat. size.*

Plate III.

Section A. Analysis of *Napoleona Vogelii.*

Fig. 1. A flower, seen from above.
2. The same, viewed sideways.
3. The corolla detached from its insertion on the disk, and seen from below.
4. The outer whorl of the corona detached, consisting of 75 free, radiating, narrow segments: *all nat. size.*
5. Three of the same segments, shown in different positions: *magnified,* to show the vesicles or abortive anther-cells.
6. The second whorl of the corona, showing 40 segments, confluent on their margin for half their length into a hemispherical cup, while the free portions are inflected and connivent over the stigma.
7. A side view of the same.
8. The same, forcibly expanded, to show the comparative length of the segments.
9. The inner whorl of the corona, consisting of 10 free stamens, inflected so that the terminal extrorse anthers are brought beneath the stigma.
10. The same, with their filaments extended to show their relative length: *all nat. size.*
11. Three of the stamens, in different positions: *magnified.*
12. The calyx, seen from below.
13. The same, viewed from above.
14. The stigma: *all nat. size.*
15. The same: *magnified.*
16. A longitudinal section of the 5-celled inferior ovary, of the short style and broad stigma, of the abbreviated vertical disk, from which the corolla and the 3 whorls of the corona have been removed, showing also the hollow central axis and 2 erect ovules fixed near the base in each cell: *magnified.*
17. A diagram of the parts of the flower in longitudinal section: *nat. size.*.
18. A fruit of the same species, crowned by the calyx, with a quarter of it cut away, showing in longitudinal section the much thicker pericarp, the hollow axis, and 2 seeds in the natural position.
19. A transverse section of the same, showing 9 radiating cells, with a single seed in each cell, without any enveloping pulp, as seen in a specimen preserved in spirits in the Kew Museum.
20. A seed, shown on its face, with a caruncular ventral scar.
21. The same, seen on its edge.
22. The same, on its face, with the thin integument removed.
23. One of the cotyledons, viewed from its inside face, showing the radicle and plumule half-immersed within the sinus.



N. Mannii.

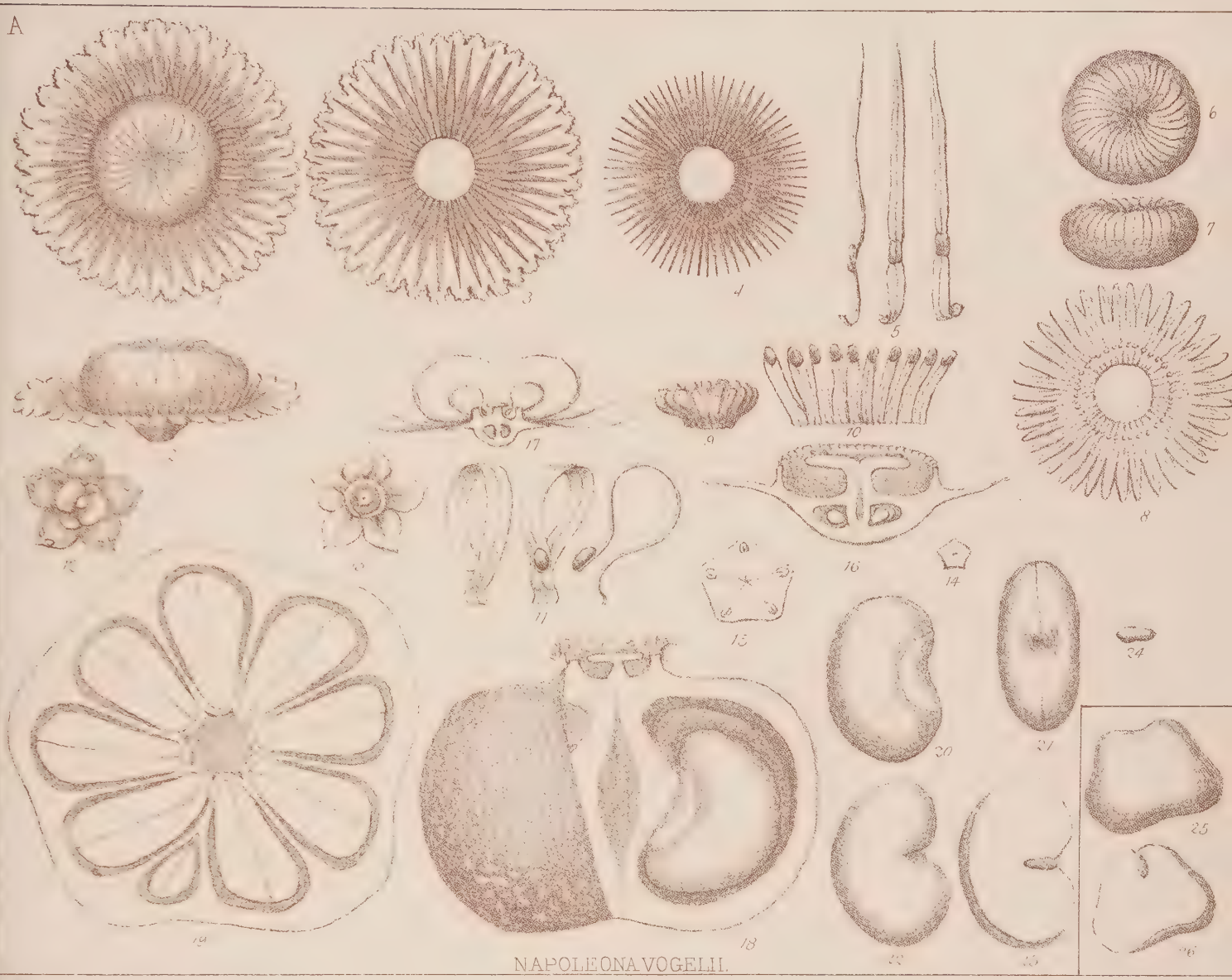
N. Cuspidata

J. Miers. del.

Maclure & Macdonald, Lith. London

NAPOLEONA.

A



NAPOLEONA VOGELII.

B

J. Miers. del

Maclure & Macdonald, Lith.

ASTELIANTHOS

J. Miers, del.

Maclure & Macdonald, Lith. London

OMPHALOCARPUM ELATUM.

Fig. 24. The radicle and plumule removed: *all nat. size.*
25. A seed of *Napoleona Heudelotii*, showing its different form.
26. One of its cotyledons, with the immersed radicle: *nat. size.* Both copied from Jussieu's drawing.

Section B. Analysis of *Asteranthos brasiliensis.*

Fig. 1. A portion of a branchlet, showing a leaf with its axillary flower,
2. A flower in bud, showing the mode of æstivation of its plicated corolla.
3. The same, when full-grown and naturally expanded, showing the three series of many free stamens seated round the disk on the base of the corolla, as seen from above: *all nat. size.*
4. Five of the stamens removed: *all nat. size.*
5. The same: *magnified.*
6. The calyx, disk, superior 8-celled ovary, style, and stigma: *nat. size.*
7. The same, seen in a longitudinal section, to show the ovules suspended from the placenta in the axis of each cell: *magnified.*
8. The same, as seen from above, showing the disk round the deeply 8-grooved conical ovary: *both magnified.*
9. The cup-shaped, 8-toothed, hollow stigma, seen also in longitudinal section: *more highly magnified.*
10. An ovule: *much magnified.*

Plate IV.

Analysis of *Omphalocarpum elatum.*

Fig. 1. A portion of the plant.
2. A fascicle of flowers, taken from the trunk of the tree.
3. The calyx.
4. The pseudo-tubular male corolla, showing the 5 petals agglutinated by their long claws to a membranaceous tubular disk.
5. The same cut open, showing 5 phalanges, each consisting of 6 equal stamens, seated on the margin of the agglutinated disk opposite each petal, with an intermediate fringed staminode alternating between each series.
6. A portion of the disk supporting its 6 fertile stamens and 2 of the staminodes: *all nat. size.*
7. Three of the same stamens: *magnified.*
8. Transverse section of an anther before and after dehiscence: *more magnified.*
9. The abortive ovary and style: *nat. size.*
10. The same: *magnified.*
11. The corolla of the female flower, similar to that of the male in every respect except that the stamens are all anantherous.
12. A portion of the agglutinated disk supporting a set of sterile filaments and two of the alternating fimbriated scales.
13. A fertile superior ovary, continuous with a long conical thick style.
14. A longitudinal section of the same, showing the hollow style bearing the channels leading to the many cells of the ovary, and surmounted by the open many-toothed stigma: *all nat. size.*
15. Shows a *magnified* view of fig. 13.
16. A transverse section of the ovary, showing its 25 cells radiating round its hollow axis: *also magnified.*

Fig. 17. A fruit, the smaller specimen in the Kew Museum, viewed sideways, with a quarter segment cut away, to show the conglomerate-like structure of the thick pericarp, the persistent style, the singular hollow axis, and the solitary seed in each cell, attached to the axis.

18. A moiety of the same fruit, seen in transverse section, showing the many radiating cells placed round the large hollow axis, each with a single seed attached in the axes.

19. One of the seeds (like that of *Lucuma*) shown on its face.

20. The same, shown on its ventral edge, which is grooved where the ascending raphe is imbedded, and in the bottom of which a very small hilum is seen.

21. A longitudinal section of the same, parallel with its faces, showing the enclosed nucleus.

22. The nucleus extracted, seen on its edge.

23. A longitudinal section of the same parallel to the faces, showing the embryo enclosed in thin corneous albumen.

24. The embryo extracted, seen on its face.

25. The same, shown on its edge.

26. A seed from the larger specimen of the fruit in the Kew Museum, shown on its face.

27. The same shown on its ventral edge, which is channelled by the raphigerous groove, in the bottom of which is seen the hilum, *h*, and near its summit the perforation, *f*, through which the chord of the raphe passes into the interior. Near the basal point the micropyle, *m*, is distinctly seen; this structure is precisely that of *Lucuma* and *Imbricaria*, shown by Gaertner.

II. *On the* Auxemmeæ, *a new Tribe of the* Cordiaceæ.

By John Miers, *F.R.S., V.P.L.S., &c.*

(Plates V.–VIII.)

Read June 18th, 1874.

This memoir, written five years ago, and alluded to on a former occasion *, describes a small group of plants marked by very peculiar characters. They are distinguished chiefly by the unusual growth of the calyx, which often increases in an extraordinary degree as the fruit advances to maturity; but they are more especially remarkable for the atropous development of their ovules and seeds. The group, consisting of the genera *Auxemma*, *Sacellium*, *Hymenesthes*, *Patagonula*, *Paradigma*, and *Plethostaphia*, may thus be characterized:—

AUXEMMEÆ.

Tribus Cordiacearum. *Flores* hermaphroditi. *Calyx* tubulosus, dentatus aut divisus, demum amplificatus. *Corolla* tubulosa. *Stamina* inclusa. *Ovarium* superum, *disco* carnoso hypogyno insitum, 4-loculare: *ovula* in quoque loculo solitaria, erecta, et atropa. *Drupa* carnosa, vel subexsucca, monopyrena: *pyren* ossea, rugosa, 4-locularis, aut abortu 2-locularis: *semen* in loculo solitarium, structura *Cordiæ*, sed omnino atropum.

1. Auxemma.

The type of this genus is a curious Brazilian plant found by Gardner, who regarded it as a species of *Patagonula*, and mentioned it in his 'Travels,' p. 159. The flower, in structure, is not unlike that of the genus just mentioned, has a more tubular calyx, which becomes vastly inflated around the fruit, increasing to about 30 times its original length, and swelling proportionally. The drupe, which it conceals, is nearly of its length, and about the size and shape of a small damson, containing a hard scrobiculated nut, which is 4-celled; its seeds distinctly atropous. The generic name is derived from αὔξω, *amplifico*, ἔμμα, *vestis*, from the singular enlargement of the calyx.

Auxemma, nob.

Calyx parvus, tubulosus, membranaceus, ore 5-dentatus, persistens et in fructu valde amplificatus. *Corolla* tubulosa; *tubus* cylindricus, calyce dimidio longior, subplicatus, fauce vix ampliore; *limbi lobi* 5 æquales, rotundato-ovati, tubum subæquantes, subexpansi, æstivatione introflexi, cum apicibus incurvatis centro conniventes. *Stamina* 5, lobis alterna, inclusa, inæqualia, tubo dimidio breviora; *filamenta* tenuia, paulo supra basin tubi inserta: *antheræ* ovatæ, 2-lobæ, lobis filamento adnatis, rima laterali utrinque dehiscentibus. *Discus* hypogynus, carnosus. *Ovarium* superum, disco insidens, conico-ovatum, 4-loculare; *ovula* in loculis solitaria, e basi erecta, atropa: *stylus* brevis, ultra medium 2-fidus, ramis divaricatis bifidis: *stigmata* 4, oblique clavata, corolla inclusa. *Calyx* in

* Contrib. Bot. ii. 261.

fructu magnopere auctus, inflatus, reticulato-membranaceus, vesiciformis, plicato-pentagonus, imo ad angulos in saccis prolatus et hinc profunde cordatus, fauce dentibus 5 angulis continuis sensim valde constrictus: *drupa* ter brevior inclusa, ovata, nitida, sarcocarpio amplo spongiose carnoso vestita, apice subumbilicata et stylo rostrata, monopyrena: *pyren* osseus, ovoideus, apiculatus, extus echinato-rugosus, apice 4-locularis, imo in cruribus 4 loculis oppositis prolatus, interstitiis cum centro excavato materia medullari farctus: *semina* in quoque loculo solitaria, atropa, erecta; *testa* tenui, *hilo* basilari cum *chalaza* confuso versus angulum notata; *embryo* exalbuminosus; *radicula* supera, brevis, teres; *cotyledones* 2, amplæ, crasso-foliaceæ, multiseriatim longitudinaliter plicatæ.

Arbuscula *Brasiliensis, frondosa, ramosissima*; folia *alterna, oblonga, petiolata*; paniculæ *in ramulis terminales, dichotome ramosissimæ, multidivisæ*; flores *parvi, plerique mox decidui.*

1. Auxemma Gardneriana, nob.: ramulis subangulatis, striatis, pallide brunneis, glabris, axillis subapproximatis: foliis lanceolato-ellipticis, imo sensim cuneatis, apice obtusis, grosse et remote dentato-sinuatis, utrinque glabris, supra subnitidis, subtus pallidioribus, nervis prominulis; petiolo tenui, limbo 9plo breviore: panicula in ramis alaribus laxa, 5–6ies dichotome divisa, artubus ultimis tenuissimis scorpioideis; floribus parvis uniserialiter sessilibus, unico maturescente, reliquis deciduis; calyce breviter 5-dentato, dense rigide pubescente; corollæ tubo membranaceo, 5-plicato, glabro, fauce ampliore, limbi lobis rotundato-oblongis, expansis, tubum æquantibus, utrinque (sed extus densius) rigide pubescentibus; staminibus 5, æqualibus, inclusis, imo tubi enatis, glabris; ovario oblongo, subconico, parvo, dense piloso; stylo piloso: drupa ovata, subcarnosa, nigra, nitida, calyce valde ampliato abscondita, monopyrena: cæt. ut in char. gen.—In Brasilia, prov. Ceará: *v. s. in hb. Mus. Brit.* inter Aracati et Ico (*Gardner*, 1779).

This is described by Gardner in his travels (*loc. cit.*) as a tree growing gregariously and abundantly in the province of Ceará, where it is known by the name of *Páo branco* (white wood); it grows to heights of from 20 to 40 feet, its wood, not very hard, being extensively used by the natives for fuel. The branchlets are 2 lines thick, with axils $\frac{1}{2}$–$1\frac{1}{2}$ in. apart; the leaves are 5–$6\frac{3}{4}$ in. long, 2–$2\frac{1}{4}$ in. broad, on petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long; the axillary panicle is about 3 in. long and broad, 5 or 6 times dichotomously divided; the ultimate divisions are very slender, $\frac{1}{2}$ in. long, bearing on one side about 8 or 10 nodules where the sessile flowers were attached; but in the dried specimen only a single flower remains upon the spikelets; the calyx is 2 lines long, $1\frac{1}{2}$ line broad; the tube of the corolla 2 lines long, the lobes of the border 2 lines long, 1 line broad; the filaments $\frac{3}{4}$ line, the ovary $\frac{3}{4}$ line long, the style of the same length. In fruit the enlarged calyx is $2\frac{1}{4}$ in. long, $1\frac{3}{4}$ in. broad, membranaceous and reticulated, with 5 acute angles, terminating below in 5 large hollow sacs which extend half an inch below the summit of the thickened spikelet, tapering upwards to a width of 4 lines, and terminated by 5 erect teeth; the drupe, fixed on the point of attachment, is $\frac{3}{4}$ in. long, 8 lines broad; the sarcocarp thick, soft, and spongious, enclosing an osseous nut with an uneven surface, with a hollow space below, filled with medullary matter; above, it has four cells, two of which are smaller, but all four contain each a single erect seed; in the base of each cell a foramen is seen for the passage of the nourishing vessels to the basal chalaza of the seed, which is nearly 3 lines long; its two integuments are white, very thin, and brittle, marked at the pointed summit by the micropyle; there is no trace of a raphe or other spiral vessels.

2. Sacellium.

This genus was established in 1808, by Bonpland, in the 'Plantæ Æquinoctiales,' where there is an imperfect description and a drawing of the typical plant. From the few particulars known of it, there can be no doubt that the genus closely approximates to *Auxemma*, agreeing with it in its enlarged inflated calyx enclosing a small monopyrenous drupe, with a 4-celled nut of similar structure. On account of the extreme difference in the appearance of the flower in its early and later stages, Bonpland erroneously concluded that the inflorescence was monœcious, bearing male and female flowers in the same panicle; but his evidence does not support this conclusion. Bonpland, who has no high claim as an observing botanist, confesses that such details of the floral structure he owes to Humboldt, who made the drawing above referred to. Kunth, 17 years later, examined Humboldt's specimen, which had no flowers, and he had only the original sketch of the latter to guide him. In regard to the fruit, he ascertained that its nut had 4 seminiferous cells in its summit; and he noted the existence of the inferior cavities figured by Humboldt, in which he found no trace of seeds. Judging by analogy, we have here, therefore, precisely the same structure as that I have described in *Auxemma*. Upon these materials a reformed generic character is constructed in the following manner:—

Sacellium, Humb. & Bonpl.

Flores hermaphroditi. *Calyx* primum parvus, tubulosus, 5-dentatus, persistens et in fructu magnopere augescens. *Corolla* brevissime tubulosa, fere ad basin 5-fida, laciniis oblongis. *Stamina* 5, imo tubi affixa, brevia, subinclusa. *Ovarium* superum, *disco* hypogyno crassiusculo insitum, 4-loculare, loculis 1-ovulatis; *stylus* bis bifidus; *stigmata* 4, parva. *Calyx fructifer* maxime auctus, oblongus, vesicæformis, submembranaceus, 5-plicatus, angulis nervosis in dentibus 5 parvis os stringentibus terminatus: *drupa* quater brevior, inclusa, oblonga, nitida, disco stipitata, stylo longe apiculata, monopyrena; *pyren* ovatus, rostratus, osseus, summo 4-locularis, imo in cruribus 4 protensus, interstitiis et centro cavato medulla repletis, loculos alteros fingentibus. *Semina* in quoque loculo solitaria, conice ovata, erecta: *integumenta* alba, tenuissima; *embryo* exalbuminosus, atropus; *radicula* parva supera, obtusa; *cotyledones* 2, magnæ, pluriseriatim longitudinaliter plicatæ.

Arbuscula *Peruviana, frondosa:* folia *alterna, lanceolata, petiolata:* panicula *supraaxillaris, dichotome ramosa;* flores *minimi.*

1. Sacellium lanceolatum, Humb. & Bonp. Pl. Æquin. i. 47, tab. 13; Lam. Dict. Suppl. v. 10, tab. 995; H., B. & K. vii. 207; DC. Prodr. ix. 502: arbuscula ramosissima, foliis lanceolatis, utrinque acutis, summum versus remote dentatis, submembranaceis, nervoso-reticulatis, supra hirtellis, subtus pallidioribus, molliter pubescentibus, costa nervisque prominulis; petiolo tereti, canaliculato, pubescente, limbo 15–18plo breviore: panicula supraaxillari, folio ter breviore, dichotome ramosa, pubescente; floribus parvis, subcrebris, brevissime pedicellatis; calyce fructifero valde aucto, acute ovato, reticulato-nervoso, membranaceo, pentagono, 5-plicato: drupa 6plo breviore ovata, rostrata: cæt. ut in char. gen. In Peruvia alta, ad fluv. Guancabamba prope Loxam (*non vidi*).

This is described as a tree 9–12 feet high, with a copiously frondose head, and a trunk with white wood, 1 foot in diameter. The axils are about $\frac{3}{4}$ in. apart; the leaves are

about 6 in. long, 14–15 lines broad, on petioles 4–5 lines long; the flowing panicle issues at a point 1 or 2 lines above the axil, is $2\frac{1}{4}$ in. long; the calyx is 1 line long, the corolla very little longer; the fructiferous calyx is membranaceous, reticulated, of a straw-colour, about 1 inch long, 7 lines broad, encloses a drupe 3 lines long, of a blackish brown colour, and polished.

3. Hymenesthes.

This genus is proposed for a plant collected in Cuba by Wright, and named "*Bourreria succulenta*, Jacq." by Dr. Grisebach, who regarded it as the flowering specimen of another plant to which he gave the same name, both having been distributed, with tickets thus denominated, under Wright's number 3119, as they appear in the herbaria of the British Museum and that of Kew. The latter plant is certainly named in error, and has been described by me as *Bourreria clariuscula* *; the former plant does not even belong to that genus †, nor to the same family, thus adding another to the many misnomers already specified in Dr. Grisebach's enumeration of Wright's Cuban plants. The structure of the flower in the plant in question differs extremely from that of *Bourreria*, and approaches that of *Patagonula*. The flowers are small; the calyx and corolla are of extremely thin texture and transparent; the tube of the latter is as long as the calyx, its border, of the same length, is divided into 5 linear-oblong segments, which are deeply introflexed and connivent over the stamens; the exserted anthers stand upon equal subulate filaments, pilose below, and inserted near the base of the tube; the ovary, style, and stigma as in the preceding genera. As all the flowers are in a young state, we have no indication of the growth of the calyx or the structure of the fruit. The genus differs from *Patagonula* in the longer tube of the corolla, in the variable number of its parts, and other particulars. Its name is derived from ὑμὴν, *membrana*, ἐσθὴς, *vestis*.

Hymenesthes, nob.

Calyx campanulatus, textura tenui, ore 3- vel 4-dentatus, dentibus rotundatis. *Corolla* tubulosa, tenuissime membranacea, tubo turbinato, calyci æquilonga, limbi lobis 4–5–6, oblongo-acuminatis, marginibus crenulato-sinuatis, valde reflexis, in æstivatione profunde introflexis et centro conniventibus. *Stamina* numero loborum, iis alterna, exserta; *filamenta* subulato-filiformia, imo compressa, patentim hirsuta, superne glabra, infra medium tubi inserta; *antheræ* ovatæ, 2-lobæ, utrinque rima laterali dehiscentes. *Ovarium* conicum, *disco* magno cylindrico continuum, 4-loculare; *ovula* in loculis solitaria, e basi erecta, atropa. *Stylus* subbrevis, fere ad basin bifidus, ramis paullo divergentibus, iterum fissis; *stigmata* 4, parva, compressa. *Cæt.* ignota.

Suffrutex *Cubensis, glaberrimus*: folia *alterna, obovata, nitida, petiolata*: panicula *terminalis, dichotome divisa*; flores *parvi*.

1. Hymenesthes nitida, nob.: *Bourreria succulenta* in parte, Griseb. (non Jacq.), Cat. Pl. Cub. 209: ramulis teretibus, subrugulosis; foliis obovatis, imo ad medium sensim attenuatis, apice rotundatis aut emarginatis, crassiusculis, utrinque glaberrimis, supra nitidis, læte viridibus, valde reticulatis, subtus pallidioribus, nervis venisque prominulis; petiolo subtenui, limbo 6plo breviore: paniculis terminalibus

* Contrib. Bot. ii. 235. † Ibid. p. 233.

dichotome multidivisis, ramis tenuibus, glabris : floribus parvis, cum pedicellis brevissimis articulatis ; calyce 3-dentato ; corolla tenuissime membranacea, limbi lobis et staminibus inconstantibus, extus obsolete puberula. In Antillis : *v. s. in hb. Mus. Brit. et Hook.* ins. Cuba (*Wright* 3119, sub nom. *Bourreria succulenta*).

The leaves are $1\frac{1}{2}$–$2\frac{1}{4}$ in. long, 1–$1\frac{1}{4}$ in. broad, on petioles 3–4 lines long; the panicle is $1\frac{1}{2}$ in. long; the calyx is 2 lines long, $1\frac{3}{4}$ line broad; the tube of the very transparent corolla, as well as its lobes, are of the same length; the lobes in the flowers of the same panicle, as well as the stamens, vary in number from 4 to 6, the rounded teeth of the calyx being constantly 3.

4. Patagonula.

The typical species of this genus was first made known by Dr. Dillen in 1732, who described it from a cultivated plant raised in Dr. Sherard's garden at Eltham, and figured by him in his Hort. Elthamensis. After the fashion of that period, he called it simply *Patagonica*, because he learned it had been introduced from Patagonia. No original specimen of the plant has ever been obtained, so that its exact locality is not known. It must be remembered that the date of Dillen's plant is 36 years prior to Captain Cook's first voyage with Dr. Solander, who was the first regular botanist to explore the Tierra del Fuego and the Straight of Magellan. We must therefore look back to the days of Dampier, who visited the coasts of Patagonia several times between 1700 and 1720, and who, it is known, had a taste for botany, and collected plants and seeds in the course of his numerous voyages. At that time, and for nearly a century afterwards, the shores of the whole of the South American continent remained utterly inaccessible to European search; and it is, therefore, with the greatest probability that we may assign the original source of the plant cultivated in Sherard's garden to the seeds brought home by Dampier from Patagonia, perhaps Tierra del Fuego. We know that a kindred species was obtained in 1820 by Sello, in South Brazil, and described in 1829 by Chamisso; but that is a far more glabrous plant, with narrower leaves, and is certainly very distinct. *Patagonula*, as a genus, was first established by Linnæus in 1787, who gave it that substantive name in lieu of Dillen's adjective prefix. It was also enumerated in Aiton's 'Hortus Kewensis' in 1789, under the name of *Cordia Patagonula*. Jussieu, in 1789, placed *Patagonula* near *Cordia*; Endlicher (1838) considered it a doubtful genus; and DeCandolle (in 1856) excluded it from the family without assigning to it another position. Prof. A. DeCandolle was of the same opinion, because he had observed its erect ovules in Blanchet's specimen from Bahia, on which account he was disposed to refer the genus to the Verbenaceæ. This opinion was not supported by Schauer, who soon afterwards composed his monograph of the latter family for the Prodromus. Fresenius, in 1857, in the 'Flora Brasiliensis,' placed *Patagonula* in the *Cordiaceæ* without hesitation, though he does not seem to have examined it. It appears that no one has taken the trouble to inquire into the subject; and I therefore give the following diagnosis, founded upon my own analysis.

PATAGONULA, Linn.; *Patagonica*, Dill.

Calyx parvus, fere ad basin 5-partitus, laciniis æqualibus, demum in fructu valde auctis. *Corolla* tubulosa, tubo calycem æquante subcampanulato, subplicatim 5-sulcato, limbi laciniis 5, ovatis, obtusis, expansis, in æstivatione apicibus incurvis centro conniventibus. Stamina 5, laciniis alterna; *filamenta* filiformia, imo latiora, supra basin tubi inserta, exserta; *antheræ* ovatæ, 2-lobæ, introrsæ, medio dorsi affixæ, longitudinaliter dehiscentes. *Ovarium* superum, conice ovatum, *disco* 4-lobo insitum, 4-loculare, ovulis in quoque loculo solitariis, e basi erectis, atropis. *Stylus* bis bifidus; *stigmata* 4, parva, subclavata. *Drupa* parva, exsucca, ovato-globosa, stylo apiculata, calyce valde aucto subcoriaceo nitido stellatim dilatato circumdata, monopyrena; *pyren* subglobosus, imo breviter stipitatus, apice rostratus, osseus, 4-locularis, loculis 2 sæpe abortivis: *semen* conico-oblongum, apice micropylo notatum, ad basin angulum versus hilo cum *chalaza* subconfuso affixum; *integumenta* 2, tenuia, albida, *raphe* nulla; *embryo* exalbuminosus, *radicula* tereti, supera, *cotyledonibus* 2 longitudinaliter multiplicatis multo breviore.

Arbusculæ *Americæ meridionalis, ramosissimæ:* folia *elliptica vel lanceolato-oblonga, glabra aut pilosula, sæpe dentata, petiolata:* paniculæ *axillares vel terminales, dichotome multidivisæ, sæpe pubescentes, ramis tenuissimis;* flores *parvi, ebracteati.*

1. PATAGONULA AMERICANA, Linn. Gen. Pl. (1737) p. 45; Poir. Dict. v. 57; Lam. Illust. 424. n. 1915, tab. 96; Cham. in Linn. iv. 492; Fres. in Mart. Fl. Br. fasc. xix. p. 27: *Patagonica*, Dill. Elth. (1732), p. 304, tab. 226. f. 293: *Cordia Patagonula*, Dryand. in Ait. Hort. Kew. i. 259: *Petræa dentata*, Spr. Sys. ii. p. 76: ramosissima, ramis teretibus, tenuibus, striatis, lenticellis albidis rugulosis, patentim longe rufo-hirtulis, rarius demum subglabris, in axillis præsertim hirtis; foliis alternis, interdum binis, oblongo-ellipticis, aut lanceolato-oblongis, imo angustioribus, apice obtusis vel subacutis, sæpius remote grosse serratis, marginibus nervigeris plus minusve ciliatis, submembranaceis, valde reticulatis, utrinque glabris, supra pallide viridibus, in costa nervisque sulcatis, subtus pallidioribus, costa nervisque prominulis, in junioribus minute pellucido-punctatis; petiolo tenui, canaliculato, limbo 15–20plo breviore: paniculis axillaribus et terminalibus, dichotome multidivisis, ramis tenuibus, rugulosis, hirsutis; floribus parvis, pedicellatis; calyce pallide membranaceo, fere ad basin 5-fido, lobis oblongis, erectis, extus glandulis fuscis piliferis punctatis, margine longe ciliatis; corolla glabra, tubo campanulato, calycem æquante, laciniis 5 æquilongis, acute ovatis, expansis, minute pellucido-punctatis; staminibus imo insertis, exsertis; ovario glabro, subconico, 4-loculari; stylo bis bifido: drupa parva, apiculata, calyce valde aucto circumdata, laciniis spathulato-oblongis, emarginatis, reticulatis, radiatim expansis. In Patagonia: *v. s. in hb. Mus. Brit.* ex hb. Mill. in hort. Warner. cult.

This species is well distinguished from *P. glabra*, which has been confounded with it, by its larger, more membranaceous, more deeply dentate leaves, hispid branchlets, and many other characters. The axils of its branches are $\frac{1}{2}$–$\frac{3}{4}$ in. apart; the leaves are 2–2$\frac{3}{4}$ in. long, $\frac{3}{4}$–1$\frac{1}{2}$ in. broad, on slender petioles 2 lines long. The panicles are 1–1$\frac{1}{2}$ in. long; the pedicels $\frac{1}{2}$ line long; the calyx 1 line long; the tube of the corolla and segments each 1 line; the lobes of the fructiferous calyx, according to Dillen, are 6 lines long, 2 lines broad.

2. Patagonula glabra, nob. : *Patagonula Americana*, var. *glabra*, Cham. Linn. iv. 492 ; Fresen. in Mart. Fl. Br. *l. c.* p. 27, tab. 9. fig. 9 : ramosissima, ramis tenuibus, striolatis, lenticellato-rugulosis, glabris : foliis lanceolato-oblongis, imo subcuneatis, apice obtusis aut subacutis, junioribus lineari-lanceolatis, summum versus remote dentatis, marginibus revolutis, subcoriaceis, impunctatis, opacis, utrinque glaberrimis, supra viridibus, subtus pallide glaucis, costa nervisque prominulis, venis tenuissime reticulatis, interstitiis elevatis, hinc quasi punctato-granulatis ; petiolo tenui, supra plano, limbo 12–15plo breviore : paniculis axillaribus et terminalibus dichotome multidivisis, glabris, raro obsolete pilosulis ; floribus parvis, pedicellatis ; calyce 5-partito, lobis oblongis, obtusis, extus pilis articulatis puberulis, apice pilis simplicibus ciliatis ; corollæ tubo calycem æquante, campanulato, extus glabro, intus scabridule pruinoso, limbi lobis 5, ovatis, tubo æquilongis, expansis ; staminibus 5, in tubi basin insertis, ultra faucem vix exsertis, glabris ; ovario conico, disco 4-lobo imposito, 4-loculari ; stylo bis bifido : drupa parva, conice globosa, imo stipitata, apice apiculata, calyce demum magnopere aucto circumdata, laciniis spathulato-oblongis vel lineari-oblongis, reticulatis, pellucido-punctulatis, glaberrimis, radiatim expansis. In Brasilia, prov. Rio Grande do Sul : *v. s. in herb. Mus. Brit. et Hook.* Encrucilhado, Rio S. Barbara (*Sellow*).

Sellow's plant was considered by Chamisso a mere variety of the typical species, which he had never seen ; but it differs widely in its much smaller, more coriaceous leaves and other characters.

It forms a tree of moderate size, furnishing a useful timber of a yellowish white colour, called *Ipé branco*. Its slender branchlets are quite glabrous, a few hairs being sometimes seen on the axillary bud ; the axils are $\frac{1}{4}$–$\frac{1}{2}$ in. apart ; the leaves, which Chamisso compares to those of the Laurel, are $1\frac{1}{2}$–$2\frac{1}{4}$ in. long, 7–12 lines broad, on petioles $1\frac{1}{2}$–2 lines long : from their opaque texture they form a great contrast to the submembranaceous leaves of the preceding species. The panicles, which have slender ramifications, are almost glabrous, about 2 in. long ; the calyx is said by Fresenius to be covered with glanduliferous hairs. I found the corolla persistent at the base of the free drupe ; it has a campanular tube 1 line long, with lobes of equal length ; the filaments are not fixed in the throat, as Chamisso states, but near the base of the tube. The fructiferous calyx has 5 spathulate lobes 10–11 lines long, $1\frac{1}{2}$–2 lines broad, with a central stipitate drupe 2 lines long and 1 line broad.

3. Patagonula Tweediana, nob. : ramulis tenuibus, angulato-striatis, glabris : foliis glaberrimis, lanceolatis vel lanceolato-oblongis, imo cuneatis et integris, a medio sursum gradatim acutis et crenulato-dentatis, chartaceis, supra viridibus, nitidis, costa flavida complanata, tenuiter nervosis, granulato-punctatis, subtus pallidioribus, nervis tenuissimis immersis, creberrime flavido-maculatis ; petiolo tenui, subplano, limbo 12–15plo breviore : paniculis axillaribus dichotome divisis, floribus parvis in ultimis sectionibus glomerulatis ; calyce 4-partito ; corollæ glabræ tubo brevi subcampanulato, limbi laciniis 4, oblongis, obtusis, extus obsolete puberulis ; filamentis tenuissimis 4, paullo sub faucem insertis, longe exsertis, sparse pilosulis :

drupa conice globosa, parva, imo brevissime stipitata et bifossata, apice rostrata, corolla persistente cincta et calyce valde aucto 4-lobo circumdata, 4-loculari (loculis 2 subabortivis); seminibus generis. In Brasilia prov. Rio Grande do Sul: *v. s. in hb. Hook.* Viamaõ (*Tweedie*, 27).

Tweedie describes this as a "fine tree," growing in the woods of Viamaõ, about 10 miles E. of Port Alegre, and 30 miles from the locality of the preceding species. It is distinguished from the latter by its more lanceolate leaves, by its glomerulate flowers, which are constantly 4-merous, by the insertion of its stamens, its hairy filaments, and the presence of 4 augmented calycine lobes around the fruit. The branches are slender, with axils $\frac{1}{2}$ in. apart; the leaves are $2\frac{3}{4}$–3 in. long, 8–10 lines broad, on petioles $2\frac{1}{2}$ lines long; the tube of the corolla is 1 line long, its lobes of the same length; the 4 patent segments of the augmented calyx are 10 lines long, $2\frac{1}{2}$–3 lines broad; the exsuccous drupe is 3 lines long, 2 lines broad, is shortly stipitate at the base, with 2 hollow cavities; the nut, somewhat fibrous in texture, has 2 larger cells, bearing each an erect seed, terminated by the micropyle, and fixed by its base to the bottom angle of the cell, with a basal chalaza, no raphe being visible.

4. Patagonula bahiensis, Moric. Pl. Amer. tab. 86; A. DC. Prodr. ix. 467, in not.; Fresen. in Fl. Br. *l. c.* p. 28: ramulis fuscis, lenticellis albis rugulosis, glanduloso-tomentosis: foliis alternis, vel 2–3 approximatis, ovato-ellipticis, utrinque subacutulis, imo circa petiolum brevissimum subito rotundiusculis, acumine obtusiusculo, fere integris, aut in marginibus cartilagineis crenulatis obsolete denticulatis, supra sublucidis, fere glabris, costa nervisque subimmersis hirtellis, subtus pallidis, opacis, dense puberulis atque setaceo-hirsutulis, costa nervisque prominulis; petiolo semitereti, setaceo-piloso, limbo 40plo breviore: paniculis axillaribus et terminalibus, tenuiter dichotome multidivisis, pubescentibus; floribus parvis, subsessilibus; calyce 5-partito, lobis oblongis, acutis, extus glanduloso-setaceo hirsutulis, margine ciliatis; corolla membranacea, minute pellucido-punctata, tubo subcampanulato, calycem æquante, limbi lobis 5, ovato-ellipticis, obtusis, subreflexis, margine ciliatis; staminibus 5, imo insertis, vix exsertis, glabris; ovario semigloboso, disco insito, 4-loculari; stylo bis bifido. In Brasilia, prov. Bahia: *v. s. in hb. Hook.* Jacobina (*Blanchet*, 3086).

Besides the above cited, DeCandolle quotes others of Blanchet's numbers (2855 and 3902) among his specimens. The axils of its branchlets are 1–$1\frac{1}{2}$ in. apart; the leaves 3–$3\frac{1}{2}$ in. long, 1–$1\frac{3}{4}$ in. broad, on petioles 1 line long; the panicle is $2\frac{3}{4}$ in. long and broad; several flowers are agglomerated at the end of its branchlets into a head 3 lines in diam.; the flower expanded is 2 lines broad, the calycine lobes $\frac{3}{4}$ line long; these expand in the fruit to a length of 9 lines and breadth of 2 lines, nerved and reticulated; the fruit as in the preceding species.

5. Paradigma.

This genus is proposed for a plant from the island of Cuba, insufficiently described many years ago by Richard as a species of *Cordia*. The general structure of the flower and fruit, the peculiar æstivation of the corolla, its numerous lobes, its sessile linear

anthers, its stigmata, the position of its ovules, and the enlargement of the calyx around the fruit, all prove it to be very different from *Cordia*. It is evidently allied to *Auxemma*, differing in its much larger corolla, in its more coriaceous calycine envelope of the fruit, the structure of which is similar to that of the genus last mentioned. The name given to it is derived from παράδειγμα, *exemplar*, as it offers a striking example of the peculiar characters which distinguish *Auxemma*.

Paradigma, nob.

Flores hermaphroditi. *Calyx* ovato-tubulosus, coriaceus, primum omnino clausus, tunc in dentibus brevibus sæpius 3, rotundatis irregularibus margine dense ciliatis apertus, demum accrescens et persistens. *Corolla* majuscula, tūbulosa, *tubo* carnosulo, pro dimidia parte inferiore anguste cylindrico et calycem æquante, seorsum subito infundibuliformi, *fauce* campanulata, crebre parallele nervosa, *limbo* 8-lobo, lobis oblongis, acutis, demum expansis, æstivatione tubo multiplicato lobis profunde introflexis et in centro conniventibus. *Stamina* 8, lobis alterna, sub faucem inclusa; *filamenta* nulla; *antheræ* æquales, lineares, intra faucem sessiles, tubo ter breviores, 2-lobæ, lobis connectivo angusto membranaceo supra medium nexis, imo segregatis et ad sinum affixis, utrinque lateraliter dehiscentibus; *pollen* globosum, reticulatum. *Ovarium* superum, oblongum, *disco* parvo insitum, 4-loculare; *ovula* in loculis solitaria, erecta, atropa; *stylus* filiformis, bis bifidus; *stigmata* 4, inclusa, majuscula, lineari-lamelliformia, marginibus anguste membranaceis et crenulato-undulatis. *Drupa* majuscula, exsucca, oblonga, apiculata, calyce coriaceo aucto ore dentato occlusa, monopyrena; *pyren* ovatus, apice conico-acutus, lateribus sulcis irregularibus et interruptis sarcocarpio repletis profunde exsculptus, dense osseus, cavitate centrali ampla excavatus, et hinc materia fibrosa vasis repleta e disco enata munitus, superne 4-locularis, loculis monospermis (uno alterove minore) ad basin pro vasorum introitu perforatis. *Semen* loculum implens, oblongo-ovatum, ad basin prope ab angulo affixum: *integumenta* 2, *externum* album, friabile, *internum* crassiusculum, opacum; *raphe* nulla; *chalaza* cum hilo basali confusa; *embryo* exalbuminosus, atropus; *radicula* supera, parva; *cotyledones* 2, carnosulæ, plurifariam longitudinaliter plicatæ.

Arbor *Antillana, ramosissima*: folia *alterna, ovata, integra, petiolata*: paniculæ *terminales, dichotome divisæ*; flores *majusculi, speciosi*.

1. Paradigma Galeottiana, nob.: *Cordia Galeottiana*, A. Rich. in Flor. Cub. Sagr. xi. 109; Griseb. Pl. Cub. 208; Walp. Ann. v. 540: ramis glabris, substriatis: foliis glaberrimis, ovalibus vel oblongis, apice breviter constrictis obtusis et canaliculatis, imo obtusis, coriaceis, integris, supra opace viridibus, costa nervisque tenuibus subimmersis, subtus pallidioribus, nervis patentibus rubellis paullo prominentibus; petiolo supra sulcato, limbo 6plo breviore: paniculis terminalibus, dichotome multiramosis, glabris, ramulis compressis, ultimis 1–2-floris, bracteis lineari-acutis valde deciduis; calyce tubuloso, coriaceo, glabro, intus parallele multinervoso, apice primum clauso, dein aperto, dentibus 3–6 rotundatis, ciliatis, extus obsolete, intus densius pilosis; corolla infundibuliformi, tubo calyce 2plo longiore, imo angustato, glabro, superne ad nervos 24 prominulos pilosulos plicato, limbo expanso, lobis 8, lanceolato-oblongis, acutis, submembranaceis, extus dense cano-tomentosis; antheris intra faucem affixis, 8, linearibus, sessilibus: ovario subulato-oblongo, striato: drupa oblonga, apiculata, calyce aucto ore contracto tecta, exsucca; pyrene 4-loculari, 4-spermo. In Antillis: *v. s. in hb. Mus. Brit.* Cuba circa Havanna (*Galeotti*, 19).

The axils of this plant are about $\frac{3}{4}$ in. apart; the leaves are $2\frac{1}{2}$–4 in. long, $1\frac{1}{4}$–$1\frac{7}{8}$ in. broad, on petioles 5–8 lines long, with about 10 pairs of slender patently divaricate nerves; the panicle is 2 in. long; the calyx in flower 5 lines long, 3 lines broad; the tube of the corolla is $1\frac{1}{8}$ in. long, $1\frac{1}{2}$ line broad at the base for a length of 5 lines, thence gradually widening to a breadth of 9 lines at the mouth; the lobes are 6 lines long; the anthers 3 lines long, 1 line broad; the conical ovary is 2 lines long, $\frac{1}{2}$ line broad; the subulate style 3 lines long, its branches 2 lines; the stigmata 2 lines long; the enlarged calyx concealing the fruit is 9 lines long, 7 lines broad; the oval drupe, attenuated at its summit, is 9 lines long, 6 lines broad; nut deeply furrowed, has a deep hollow along its axis, and has 4 basal cavities at its base filled with pithy matter, as in *Auxemma*.

6. Plethostephia.

This genus is proposed for another of Richard's Cuba plants, his *Cordia angiosperma*, which differs from that genus in its large salver-shaped corolla, with a rotate border of 15 lobes, with their margins overlapping one another dextrorsely, in its 10 included stamens in 2 unequal series, its 10-lobed hypogynous disk supporting a 4-celled ovary. The calyx is tubular, and 5-toothed, becoming thicker and enveloping the fruit as in the preceding genus. As I have not seen any specimen, the generic character is founded wholly on Richard's description and figures. Its name is derived from πλῆθος, *multitudo*, στέφω *corono*, because of the many-lobed border which crowns the corolla.

Plethostephia, nob., *Cordiæ* sp., Rich.

Calyx tubulosus, margine 5-dentatus, persistens et augescens. *Corolla* subhypocrateriformis, tubo calyce 3–4plo longiore, imo cylindrico, sursum anguste infundibuliformi, fauce nuda, *limbo* patentissimo, tubo 5plo breviore, in lacinias 15 diviso, *laciniis* recte oblongis, acutis, marginibus (sec. icon.) dextrorsum imbricantibus. *Stamina* 10, inæqualia, alternatim biseriata, inclusa; *filamenta* subbrevia, teretia, erecta, supra medium tubi inserta; *antheræ* ovatæ, filamento ter breviores, 2-lobæ, lobis adnatis introrsum dehiscentibus. *Discus* hypogynus, pulvinatus, crenatim 10-lobus: *ovarium* superum, oblongum, disco insitum, 4-loculare; *ovula* in quoque loculo solitaria, erecta, atropa; *stylus* filiformis, corollæ tubo æquilongus, apice 4-fidus, laciniis recurvis; *stigmata* 4, parva, capitata. *Drupa* conice ovata, carnosa, imo stipitata, stylo immutato recurvo apiculata, calyce aucto incrassato occulta, monopyrena; *pyren* osseus, acute ovatus, imo disco stipitatus, summo apiculatus, extus sulcis profundis exsculptus, abortu 2-locularis; *semen* in quoque loculo unicum, basi stipitato-affixum, erectum.

Arbor *Antillana, ramosa:* folia *coriacea, late ovata, undulato-crenata, petiolata:* paniculæ *terminales, dichotome divisæ;* flores *pedicellati, speciosi.*

1. Plethostephia angiocarpa, nob.: *Cordia angiocarpa*, A. Rich. in Fl. Cub. Sagr. 119, tab. 60; Walp. Ann. v. 540: ramulis validiusculis hirsutissimis: foliis in apice ramorum subconfertis, late ovalibus aut suborbicularibus, imo obtusis et in petiolum breviter acutatis, apice rotundatis, integris, vel ad margines subundulato-sinuatis, nervis utrinque 6 divergentibus, venis parallele transversis, utrinque hirto-scaberrimis; petiolo late sulcato, limbo 7plo breviore: panicula terminali, brevissime pedunculata, quater dichotome divisa, ferrugineo-hirta; floribus spe-

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AUXEMMA GARDNERIANA

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ciosis, pedicellatis; calyce tubuloso breviter 4-dentato, pedicello 3plo longiore, ferrugineo-hirto, demum in fructu aucto; corollæ tubo calyce 3plo longiore, striato, hirto, limbi rotati laciniis 14–15, oblongis, acutis; staminibus 10, omnino inclusis, supra medium tubi insertis; ovario ovato, disco insito; stylo tenui corollæ longitudine: drupa oblonga, acuta, subcarnosa, imo disco crasso stipitata, apice stylo recurvulo apiculata, calyce aucto incrassato inclusa; pyrene valde exsculpto abortu 2-loculari, loculis monospermis. In Ins. Cuba (*non vidi*).

Its stout branchlets have their axils 3–4 lines apart; the leaves are $3\frac{1}{4}$–5 in. long, $2\frac{1}{4}$–3 in. broad, on petioles 9–11 lines long; the panicle is $3\frac{1}{2}$ in. long, the peduncle 2 lines long, the ramifications 4 lines long, the ultimate pedicels 2 lines long; the calyx is 5–7 lines long, 3 lines broad; tube of corolla $1\frac{3}{4}$ in. long, contracted at its base for the length of 5 lines, where it is 2 lines broad, gradually enlarging towards the mouth, which is 6 lines broad; the horizontally expanded segments of the border are equally 4 lines long. 2 lines broad; the filaments are inserted about 2 lines above the middle of the tube alternately a little above the others; the filaments $2\frac{1}{2}$ lines long, the anthers $1\frac{1}{2}$ line long; the ovary 2 lines long, on a disk 1 line high; the style 17 lines long, its 4 recurved branches 2–3 lines long; the enlarged calyx is 12 lines long, encloses a drupe, which, with its discal support, is 10 lines long, 5 lines broad. A drawing of this plant, with its analytical details, copied from Richard's figures, is given in Plate VIII. of the present memoir.

DESCRIPTION OF THE PLATES.

Plate V.

Shows a branchlet of *Auxemma Gardneriana*, with its dichotomously divided panicle of small flowers.

Fig. 1. A flower.
2. The calyx and corolla, seen separately: *all nat. size.*
3. The calyx: *magnified.*
4. The tubular corolla, with its segments inflected in æstivation.
5. The same, after expansion, when the segments become reflected.
6. The same, cut open to show the position of the stamens.
7. The five unequal stamens, shown separately: *all equally magnified.*
8. The same: *more magnified.*
9. The ovary seated on the hypogynous disk, with the style and stigmata.
10. A longitudinal section of the same.
11. A transverse section of the 4-celled ovary: *all equally magnified.*
12. The persistent calyx, now grown to 30 times its former length, becoming a reticulated bladder-like envelope, deeply 5-angled, narrowed by 5 teeth in the mouth, and deeply cordate at the base.
13. The same, with a portion cut away to show the enclosed drupe.
14. The same, with half of the calyx cut away transversely, showing its angular form around the enclosed drupe.

Fig. 15. The fleshy drupe, shown separately.
16. Half of the pericarp of the same removed, showing the enclosed muricated osseous nut.
17. The nut cleared of all the pericarp, when its four basal fangs are seen round the hollow base.
18. A longitudinal section of the same, showing an erect seed in each cell, attached at its base by a broad hilum, into which the nourishing vessels from the basal cavity pass through distinct perforations.
19. A transverse section of the nut, with its 4 cells, each containing a single erect seed.
20. One of the seeds: *all nat. size.*
21. The same, with the integument removed, leaving the exalbuminous embryo, consisting of a small superior radicle and 2 very plicated cotyledons.
22. The same, seen from above: *both magnified.*

Plate VI.

Section A. Shows a branch of *Sacellium lanceolatum*, in flower and fruit: copied from the drawing of Bonpland.

Fig. 1. A flower: *nat. size.*
2. The calyx: *magnified.*
3. The corolla.
4. The same, cut open, to show the position of its 5 equal stamens.
5. The ovary seated on a fleshy disk, surmounted by the style and stigmata: *all equally magnified.*
6. The much enlarged vesicoid calyx, contracted in the mouth by 5 teeth, and surrounding the drupe fixed at its base.
7. The same, with half of the calyx cut away, showing the drupe placed in the centre, as viewed from above.
8. The drupe removed, apiculated by the style, and seated on the stipitiform disk.
9. A longitudinal section of its enclosed osseous nut, showing in its upper portion 2 of its 4 cells, each with an erect seed: the lower portion is hollow between 4 descending fangs (as in *Auxemma*); and it was this hollow part which Bonpland mistook for 4 sterile cells.
10. A transverse section of the same, across the 4 equal cells.
11. One of the seeds, with a broad basal hilum: *all nat. size.*
12. The embryo, deprived of its integument, formed like that of *Auxemma*, with a small superior radicle, and 2 very plicated cotyledons.
13. The same, as seen from above: *both magnified.*

Section B. A branchlet of *Hymenesthes nitida* in flower.

Fig. 1. A flower: *nat. size.*
2. The calyx.
3. The corolla, with its segments inflected in æstivation.
4. The same, after expansion.
5. The same cut open, to show the position of the stamens.
6. The ovary, disk, style, and stigma: *all equally magnified.*
7. The stamens, seen in different positions.
8. The ovary, seated on the disk, surmounted by the style and stigma.
9. A longitudinal section of the same, showing 2 of its 4 cells.
10. A transverse section of the same, showing its 4 cells: *all more magnified.*

HYMENESTHES-NITIDA.

SACELLIUM-LANCEOLATUM.

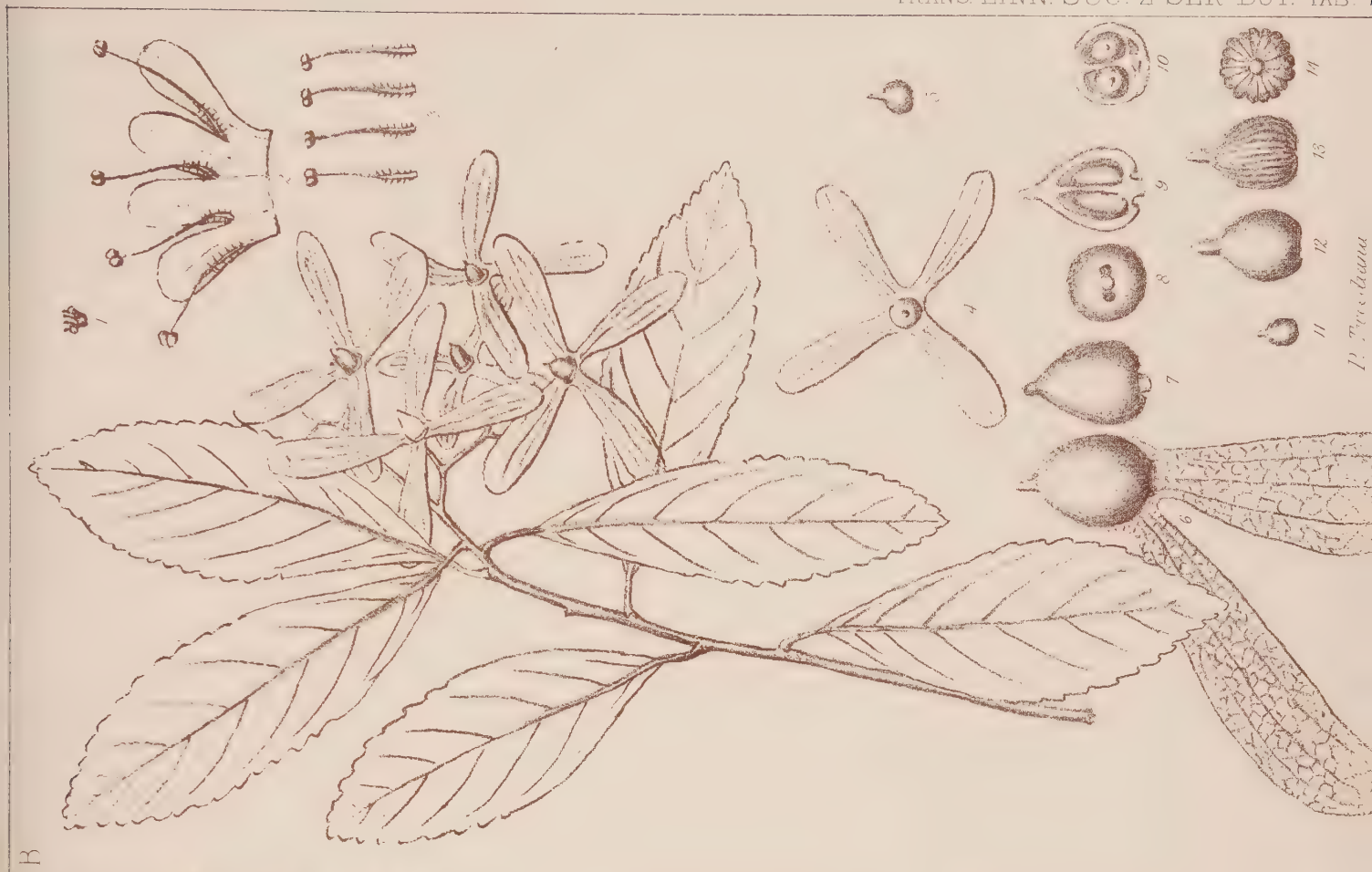

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Plate VII.

Section A. shows a branchlet of *Patagonula bahiensis* with its dichotomously divided panicle.

Fig. 1. A flower: *nat. size.*
2. The same: *magnified.*
3. The calyx.
4. The corolla.
5. The same, cut open to show the position of the stamens.
6. The ovary upon the disk, with the style and stigma: *all magnified on the same scale.*
7. Three of the stamens before and after dehiscence: *more magnified.*
8. The fruit, surrounded by the 5 persistent lobes of the calyx, now greatly enlarged and horizontally expanded: *nat. size.*

Section B. A branch of *Patagonula Tweediana*, with its dichotomous panicle in fruit.

Fig. 1. A persistent flower found at the base of one of the fruits: *nat. size.*
2. The same *magnified,* and cut open, to show the position of its 4 stamens, alternate with 4 segments.
3. The stamens shown separately: *also magnified.*
4. A drupe surrounded by the 4 persistent, and now much enlarged, lobes of the calyx.
5. The dry drupe detached: *both nat. size.*
6. The same, with part of the calycine lobes: *magnified.*
7. The same detached, and supported by the stipitate disk.
8. The same viewed from below, to show the two basal hollows.
9. A longitudinal section of the same showing in each cell an erect seed, fixed at its base, where the nourishing vessels, proceeding from the torus, perforate the nut, to reach the hilum.
10. A transverse section of the same, showing 2 fertile and 2 sterile cells.
11. One of the erect seeds, the chalaza confounded with the basal hilum: *all magnified on the same scale.*
12. The same enlarged.
13. The same, with its integument removed, exposing the exalbuminous embryo, like that of *Auxemma.*
14. The same viewed from above: *all more magnified.*

Plate VIII.

Section A. A branch of *Paradigma Galleottiana*, with its dichotomous corymb, drawn from an original specimen collected by Galleotti.

Fig. 1. A flower in bud.
2. The calyx.
3. The corolla beginning to open.
4. The same cut open, showing how the 8 segments are inflected in æstivation, and the relative position of the 8 stamens. The corolla, fully grown and expanded, is seen in the drawing of the plant.
5. The ovary, disk, style, and stigmata: *all nat. size.*
6. The same: *magnified.*

7. One of the sessile stamens, formed of 2 linear anther-cells, connected by a shorter intermediate membranaceous connective, attached at its sinus to the corolla: *more magnified.*
8. One of the 4 compressed linear stigmata, cinctured by an undulating membrane: *much magnified.*
9. The persistent calyx, now much enlarged, and enclosing the drupe.
10. The fleshy drupe removed.
11. The fleshy pericarp of the same taken away, leaving a deep foveolated osseous nut.
12. A transverse section of the nut, showing 2 fertile and 2 sterile cells, placed round the hollow axis.
13. A longitudinal section of the same, showing the hollow axis and the 2 fertile cells, each with an erect seed fixed at its base: *all nat. size.*
14. A *magnified* view of the same, showing the nourishing vessels, ascending from the torus, and perforating the nut, to reach the chalazal point of attachment of each seed.
15. The erect seed, separated.
16. The same, deprived of its integuments, leaving an exalbuminous embryo, like that of *Auxemma*: *both magnified.*

Section B. Portion of a branch of *Plethostephia angiocarpa*, with its dichotomous panicle: copied from Richard's drawing.

Fig. 1. A flower.
2. The calyx.
3. Half of the corolla laid open, showing 8 of its 15 segments, and 5 of its 10 stamens, in 2 series.
4. The calyx half cut away, to show the enclosed ovary upon its disk, and surmounted by the style and stigmata: *all nat. size.*
5. A longitudinal section of the ovary and disk, showing an erect ovule in each cell.
6. A transverse section of the same, showing its 4 cells: *both magnified.*
7. The persistent calyx, now much increased, and enclosing an oval drupe.
8. The drupe with the fleshy pericarp removed, leaving an osseous foveolated nut, apiculated by the style.
9. A transverse section of the same, showing 2 fertile and 2 abortive cells: *all nat. size.*
10. A longitudinal section of the same: *magnified.*